Contextual Realism and Quantum Mechanics

The reason for the quantum correlations - a confusing wave function. The correlated quantum events are not autonomous, but are defined in the context of their observation. Regardless of their means of identification, there are no events. The reduction of the wave function in the "measurement process" is not a real physical process that requires its explanation, but the transition to the context of measuring a specific value of physical quantity. Accordingly, measurement is not a physical interaction leading to a change in the state of the system, but the identification of contextual physical reality. The problem of measurement, or the problem of applying quantum theory to reality, is the result of mixing the categories of ideal, to which the theory refers, and real, to which its application refers. It is eliminated logically. Problem - instantsiatsiatsii Wittgensteinovskoj problems sledenija praglu. The role of Wittgensteinovskogo rule (norm), "measuring" physical reality within the limits of language game of its application, plays the quantum theory.
This book has been translated with Artificial Intelligence.

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"L'écart entre le factuel - le reel: ce qui n'est jamais que ce qu'il est - et la norme qui a vocation à le cerner, de facon correcte ou incorrecte, me parait constituer une structure fondamentale de ce que j'appelle (...) "réalisme": by the fact that there is always only what it is - and the norm, which has the purpose of revealing it, correctly or incorrectly, as it seems to me, is the fundamental structure of what I call (...) "realism").

[Benoist 2017: 99]. (Benoist, J. L'adresse du réel. Paris: Vrin, 2017.)

"(...) Un réalisme non plus de l'idéalité, mais de la règle, qui traite les instances réelles non plus comme des approximations de quoi que ce soit, mais comme des applications, correctes ou incorrectes, de la règle" (realism is not idealism, but rules, treating real instantiations not as approximations to anything, but as applications, correctes ou incorrectes, de la règle).

[Benoist 2018: 20.] (Benoist J. Old and New Realizations. Paris: Vrin, 2018.)

"It seems to us as if we should go deep into the phenomena, but our research is not aimed at phenomena, but, you might say, at 'possibilities' of phenomena. That is, we remind ourselves of the type of statement that tells about phenomena. (…)

Our study is grammatical. And this study sheds light on our problem, eliminating misunderstandings related to the use of words in the language, misunderstandings generated by, among other things, certain analogies between forms of expression in different areas of our language. Some of them can be eliminated by replacing one form of expression with another, such a replacement can be called "analysis" of our forms of expression, for this process sometimes resembles decomposition into constituent elements".

(Wittgenstein, Philosophical Studies, § 90.)

The third way in which progress can happen is how it does in philosophy: ideas are debated, absorbed, proved powerful, or weak, and slowly are retained or discarded. I am personally actually confident that this can happen for quantum theory. The key to this, in my opinion, is to fully accept this interference between the progress of fundamental physics and some major philosophical issues, like the question of realism, the nature of entities and relationships, and the question of idealism. Accepting the reciprocal interference in particular to reverse the way general philosophical stances color our preferences for interpretation. That is, rather than letting our philosophical orientation determine our reading of QM, be ready to let the discoveries of fundamental physics influence our philosophical orientations (a third way of making progress is as follows in philosophy: ideas are debated, absorbed, proved to be strong or weak, and gradually retained or discarded. Personally, I'm sure it could happen to quantum theory. The key to this, in my opinion, is the full acceptance of the interaction between the progress of fundamental physics and some major philosophical issues such as realism, the nature of objects and relationships and idealism. Accepting mutual influence means, among other things, turning to the way the general philosophical attitudes color our interpretive

preferences. That is, instead of allowing our philosophical orientation to determine the reading of quantum mechanics, be prepared to allow the discoveries of fundamental physics to influence our philosophical orientations).

[Rovelli 2018.] (Rovelli C. 'Space is blue and birds fly through it' // Philosophical Transactions A, 2018. arXiv:1712.02894.)

"A few more remarks of a general nature concerning concepts and [also] concerning the insinuation that a concept-for example that of the real-is something metaphysical (and therefore to be rejected). A basic conceptual distinction, which is a necessary prerequisite of scientific and pre-scientific thinking, is the distinction between "sense-impressions" (and the recollection of such) on one hand and mere ideas on the other. There is no such thing as a conceptual definition of this distinction (aside from circular, i.e., such as make a hidden use of the object to be defined). Nor can it be maintained that at the base of this distinction there is a type of evidence, such as underlies, for example, the distinction between red and blue. Yet, one needs this distinction in order to be able to overcome solipsism. Solution: we shall make use of this distinction unconcerned with the reproach that, in doing so, we are guilty of the metaphysical "original sin." We regard the distinction as a category which we use in order that we might the better find our way in the world of immediate sensations. The "sense" and the justification of this distinction lies simply in this. But this is only a first step. We represent the sense-impressions as conditioned by an "objective" and by a "subjective" factor. For this conceptual distinction there is also no logical philosophical justification. But if we reject it, we cannot escape solipsism. It is also the presupposition of every kind of physical thinking. Here too, the only justification lies in its usefulness. We are here concerned with "categories" or schemes of thought, the selection of which is, in principle, entirely open to us and whose qualification can only be judged by the degree to which its use contributes to making the totality of the contents of consciousness "intelligible". The above mentioned "objective factor" is the totality of such concepts and conceptual relations as are thought of as independent of experience, viz., of perceptions. So long as we move within the so programmatically fixed sphere of thought we are thinking physically. Insofar as physical thinking justifies itself, in the more than once indicated sense, by its ability to grasp experiences intellectually, we regard it as "knowledge of the real." (A few more general remarks about concepts and [also] about the hint that a concept, such as a real concept, is something metaphysical (and therefore should be discarded). The main conceptual difference, which is a prerequisite for scientific and pre-scientific thinking, is the difference between "sensual impressions" (and memories of them), on the one hand, and simple ideas, on the other. There is no such thing as a conceptual definition of this difference (except for circular definitions, i.e. those that use the defined object in a hidden way). Nor can it be argued that this distinction is based on the type of obviousness that, for example, underlies the distinction between red and blue. However, this distinction is necessary in order to overcome solipsism. Solution: We will use this distinction without paying attention to the reproach that we are guilty of a metaphysical "original sin". We see this distinction as a category that we use to better find our way in the world of the immediate sensation. "Meaning" and the justification for this distinction is only this achievement. But this is just the first step. We present sensual impressions as caused by "objective" and "subjective" factors. There is also no logical philosophical justification for this conceptual difference. But if we reject it, we can't avoid solipsism. It is also a prerequisite for any kind of physical thinking. Here, too, the only justification is its usefulness. Here we are dealing with "categories" or schemes of thinking, the choice of which, in principle, is completely open to us, and the qualification of which can be assessed only to the extent that its use contributes to the fact that the totality of consciousness content becomes "meaningful". The "objective factor" mentioned above is a set of such concepts and conceptual relations that are considered independent of experience, namely perception. As long as we are in such a software fixed sphere of thinking, we think physically. Since physical thinking systematically justifies itself in this sense by its ability to intellectually grasp experiences, we consider it "real knowledge").

(Albert Einstein. In the «Reply to Criticisms» section of the Schilpp volume A. Einstein, «Remarks Concerning the Essays Brought Together in This Co-operative Volume» in Albert Einstein: Philosopher-Scientist, edited by P. A. Schilpp, (Tudor Publishing Co., New York, 1949), pp. 665–688. Цитируется в C. A. Fuchs. On Participatory Realism. https://arxiv.org/abs/1601.04360.)

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Foreword

According to philosopher Hilary Putnam, any serious philosophical position, both realistic and anti-realistic, must take into account "(...) the most fundamental physical theory we have (quantum mechanics)". (See p. X Foreword to Putnam 1990.) For his part, the theoretical physicist Carlo Rovelli calls not to interpret quantum mechanics according to a philosophical orientation, but rather to "allow the discoveries of fundamental physics to affect our philosophical orientations". [Rovelli 2018]

All interpretations of quantum mechanics, conventionally speaking, can be divided into two classes: anti-realistic (positivist, instrumentalist, neo-Cantian [Bitbol 2009] and others) and realistic. The[1] first class with known reservations includes the Copenhagen interpretation (Bohr, Heisenberg, Paulie and others), which considers quantum mechanics as a tool for describing and predicting quantum mechanical phenomena, information iterpretation (see "The first class of quantum mechanics"), For example, [Hoehn 2014, 2018], [Fuchs "Quantum mechanics as quantum information"]), "Cubism"[2] [Fuchs "Notwithstanding Bohr..."; Baeyer, 2016], and to the second - the theory of wave function collapse, theories with hidden parameters (for example, the theory of de Broyles-Bohm) and theories introducing many worlds and/or many consciousnesses [Bitbol 2000a]. The original interpretation of Everett [Everett 1957] stands out. Usually it is referred to realistic interpretations. Carlo Rovelli's relational interpretation of quantum mechanics, developed since 1996, is positioned by him as realistic in a weakened sense (although there are neo-Cantian, empirical and structural interpretations of this interpretation): real quantum state and values of physical quantities exist only for the (relatively) "observer" interacting during the observation with the observed physical system. The role of observer is played by any physical system interacting with the observed quantum system [Rovelli 1996, 2016, 2018]. Rovelli's interpretation is closely related to the interpretation of quantum mechanics in the language of information theory. We can also establish links between it and Michel Bitbol's pragmatic and realistic "modal (or participatory) substitution realism" (in combination with quasi-realism) approach, which we find more satisfactory than the above approaches [Bitbol 2015]. Our own interpretation is Wittgenstein's within the framework of "contextual realism" by Joslyn Benoit [Prissy 2018A "Contextual realism in physics"]. In many ways it is close to the interpretation of Bitbol [Bitbol 2015, 2019].[3]

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[1] The list of basic interpretations of quantum mechanics is given, for example, in [Fuchs, "QBism: Quantum Theory ..."].

[2] Cubism is a kind of Bayesian approach to quantum mechanics, that is a kind of quantum Bayesianism. This is one of the latest interpretations of quantum mechanics. See the work of Christopher Fuchs. See also [Mermin 2016], [Baeyer 2016].

Within the framework of our interpretation, any established and proven theory, including quantum mechanics, has its own field of application, within which it tends to give truth and knowledge, universal in its very purpose. One can only talk about the universality of quantum mechanics in this - tautological - sense. Outside the field of applicability, the theory, strictly speaking, makes no sense. In other words, an established theory acquires the logical status of a rule/norm for measuring reality. As a result, by definition, it cannot be falsified [Prize 2014A].[4]

Arbitrary hypotheses, i.e. hypotheses not rooted in experience and practice, or those related to other areas of knowledge, cannot influence the acceptance of a theory and cannot refute an established theory. In experimental philosophy, propositions gathered from phenomena by induction should be taken to be either exactly or very nearly true notwithstanding any contrary hypotheses, until yet other phenomena make such propositions either more exact or liable to exceptions" [Newton 2012].

At first glance, the counter-examples could be the Ptolemy system and Aristotle's mechanics. At one time, these theories were well-established and widely accepted. They're currently being rejected. In fact, we should rather talk, if we use Wittgenstein terminology, about the transformation of the "life form". Mathematically, the Ptolemy system is not outdated. As to Aristotle's mechanics, as Carlo Rovelli asserts, it is close to Newton's mechanics in the same sense, in

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[3] Bitbol, for example, speaks about the possibility to deduce a significant part of quantum mechanics formalism, based on two fundamental hypotheses: contextuality, i.e. relativity, determinants, and the invariance of a symbol designed to predict their experimental values in different contexts. This also makes quantum mechanics understandable [Bitbol 2019: 261].

Some of our conclusions come with (or are close to) those made by Bitbol in the book [Bitbol 2019], which we briefly reviewed after the present work was mostly completed. Accordingly, our references to this book have been added later. The difference between us is that Beatball has a significant role in the Neocantian approach in the broad sense, while we proceed from our realistic interpretation of the second and late Wittgenstein philosophy, as well as the contextual realism inspired by the Wittgenstein philosophy of Jocelyn Benoist, whose main points we share [Benoist 2010-2019]. From Benoit, we take as a fundamental point the categorical distinction between ideal and real.

[4] This does not mean that it cannot be "falsified" in terms of a more general theory, such as quantum field theory. In a similar way Einstein's special theory of relativity and non-relativistic quantum mechanics "falsify" Newton's mechanics which from their point of view (in their area of definition) appears either approximate, or false (and, strictly speaking, senseless) theory. At the same time, in terms of its applicability, the latter should be regarded as true, both in the epistemic (empirical) sense and logical.

which the latter is close to Einstein's theory. Einstein's theory limited the scope of newtonian mechanics, not refuted it. Newton's mechanics restricted the scope of applicability of Aristotle's mechanics [Rovelli 2013].

In our interpretation, the specific applicability of any theory, including quantum mechanics, depends on context, and both in the broad sense - theory is applicable only in its area of applicability (this is tautology), and in the narrow sense - each specific application of theory in its area of applicability requires taking into account specific conditions (context). The notion of context implies the notion of a norm that is implicit or explicit in a given context. And vice versa: if there is a norm, that is its application in context. The theory, as mentioned above, plays the role of a norm (rule) rooted in reality. That's the rule in the late Wittgenstein sense. We will talk about the Wittgenstein rule [Pris 2008, Pris 2015, Pris 2012, 2014A, 2014B, 2018A, 2018B].

The problem of applying the norm/regulation in context is the Wittgenstein problem of following the rule. The structure of this problem is the structure of contextual realism. Its instantsiyami are problem of measurement in quantum mechanics, a difficult problem in philosophy of consciousness, established by Gödelem problem incompleteness of mathematics and others, between which there is, thus, "family similarity". The failure between a rule (norm) and its application within a "life form" and in a context - a "language game" - is logical, not substantive. This is a failure between the categories of the ideal, to which norms, rules, concepts relate, and the real, to which the application of norms, rules, concepts relate.[5] It was originally closed as part of the correct application of the rule of law, that is, as part of an authentic (established or post facto justified) language game [Pris 2008, Pris 2015, Pris 2012, 2014A, 2014B, 2018, 2018A, 2018B].

Our position is consistent with the realistic position of Joslyn Benoit: "L'écart entre le factuel - le reel: ce qui n'est jamais que ce qu'il est - et la norme qui a vocation à le cerner, de facon correcte ou incorrecte, me parait constituer une structure fondamentale de ce que j'appelle (...) "réalisme"): by the fact that there is always only what it is - and the norm that has the purpose of revealing it, correctly or incorrectly, I think, is the fundamental structure of what I call (...) "realism") [Benoist 2017: 99]. (Benoist, J. L'adresse du réel. Paris: Vrin, 2017.)) This "(...) un réalisme non plus de l'idéalité, mais de la règle, qui traite les instances réelles non plus comme des approximations de quoi que ce soit, mais comme des applications, correctes ou incorrectes, de la règle", but rules interpreting real instantiations not as an approximation to anything, but as applications, correct or incorrect, rules) [Benoist 2018: 20]. (Benoist J. Réalismes anciens et nouveaux. Paris: Vrin, 2018.)

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[5] The difference between the categories of ideal and real, which metaphysics ignores, we borrow from Jocelyn Benoit.

Introduction: The main problem of the philosophy of quantum mechanics

The main problem of the philosophy of quantum mechanics is the measurement problem: the "process" of measurement is not described by Schroedinger's equation and requires independent consideration, in particular, to clarify the role of the quantum mechanic observer and therefore the nature and role of consciousness. The philosophy of quantum mechanics is thus related to the philosophy of consciousness [Bitbol[6] 2000]. Moreover, as it turns out, the so-called "difficult problem" of the philosophy of consciousness has the same structure as the quantum mechanical problem of measurement [Prissy 2014B][7]. And both problems require a language philosophy for their solution. The philosophy of late Wittgenstein, which is perhaps not so much a philosophy of language as a philosophy of consciousness, makes it possible[8]to treat these problems as pseudo-problems and get rid of them [Princess 2018].

Quantum mechanics is a non-classical theory, both in terms of physics and philosophy. That's why it's so difficult to find a satisfactory interpretation of it. The study of consciousness also requires unconventional scientific and philosophical approaches and perhaps an expansion of the very notion of exact science. At the same time, it requires conceptual analysis of concepts.

For example, as part of his neuro-phenomenological approach, Francisco Varela proposes to take into account, along with purely neurological data, a stabilized phenomenal experience, thus expanding neurological science [Varela 1996].

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[6] And vice versa. For an explanation of consciousness or at least for revealing of its physicalist basis it was offered to apply also quantum mechanics - the nonclassical probability theory describing the phenomena of the microcosm. More recently, such areas of research as "quantum consciousness", "quantum biology", "quantum neurophysics" and others have emerged and become popular.

For example, Roger Penrose and Stuart Hameroff (see, for example, [Penrose 1989, 1994], [Hameroff & Penrose 1996], [Hameroff 2014]) explain the emergence of consciousness through the laws of quantum physics. To understand the neuroprocesses in the brain, Mathieu Fisher [Fisher 2015] suggested applying the quantum phenomenon of nuclear spin entanglement. The unity of consciousness was attempted to be explained by the holistic nature of quantum phenomena and, in particular, the Bose-Einstein quantum condensation phenomenon [Marshall & Zohar 1990]. According to Hameroff, quantum mathematics is an adequate tool for studying cognitive and decision-making processes. Understanding the relationship between quantum mechanics and consciousness requires the development of quantum information theory and the creation of quantum computers.

[7] It is also argued that quantum phenomena and the phenomena described in the theory of decision-making have a common relational nature [Zwirn 2009], [Busemeyer 2009], [Bitbol 2019: 218]. For example, it has been shown that the statistical distribution of the choices made by the speaker concerning the meaning of polysemantic words in different discursive contexts fully coincides with the probabilistic predictions of quantum mechanics [Bitbol 2019: 218], [Bruza 2009].

[8] See, for example, [Benoist 2012 Wittgenstein philosophe de l'esprit].

Claude Romano, extends the concept of rationality by introducing phenomenological rationality [Romano 2010]. Jocelyn Benoit criticizes the traditional phenomenology and proposes an "anti-phenomenology" (das Gegenteil der Phämenologie), which does not reduce the Datum (Gegebenenen) to the Datum (Gegebenheit), but instead recovers the Datum (Benoist 2010 A, Das Gegenteil). Although Romano and Benoit have different approaches, both agree that traditional phenomenology must be transformed in a realistic way. The phenomena are not autonomous, as traditional phenomenology thought, but rooted in reality.

At the same time, traditional metaphysical realism is not an appropriate philosophy for understanding modern physics and consciousness. Together with Hilary Patnam, Michel Bitbol, Jocelyn Benoist and other philosophers, we reject him [Putnam 1990], [Bitbol 2000-2019], [Benoist 2010-2019]. From the point of view of quantum mechanics, there is no external object reality to which its laws apply. Consciousness is also not an object like the everyday objects around us or physical objects. Metaphysical platonism, which objectifies thought and consciousness, leads to unsolvable philosophical problems.

As for the Cantian approach, it overlooks living experience, phenomenal consciousness, rejects the knowledge of things themselves, and some Cantian categories are incompatible with quantum mechanics. For example, as Heisenberg showed, quantum mechanics rejects the Kantian causality category. Schrodinger has shown that she rejects the substance category. The so-called paradox of Einstein-Podolsky-Rosen (EPR) indicates that the category of interaction is also inapplicable.

The Kantian a priori forms of sensual contemplation (the a priori conditions of any experience) - the Euclidians of space and time - were rejected by Einstein's general theory of relativity even before the creation of complete quantum theory. (As Einstein stated in 1924, it is no longer possible to adhere to "Kantian a priori concepts and norms").

In modern theories of quantum gravity space-time in the sense of smooth variety is not fundamental at all. It can be considered as emerdjantic or it can be assigned a functional role (the approach is similar to the functional approach in the philosophy of consciousness). Non-switchy geometry of Alain Conna unites all kinds of interactions, including gravitational, algebraic within the framework of non-switchy space-time.

At the same time, as Bitbol notes, there are three strategies for adapting transcendental epistemology to modern physics. 1) Limiting its area of application

to the area of ordinary knowledge. 2) The search for more general a priori principles that cover the quantum and relativist domains. 3) Introduction of the notion of relative and historical a priori [Bitbol 2009]. The concept of relative a priori, which depends on the field of cognition, introduces, for example, Reichenbach [Reichenbach 1920, 1924]. Within the framework of his "practical realism" Heisenberg introduces the concept of relative "practical a priori", thus transforming the Kantian concept of synthetic a priori [Heisenberg 1958].

Michelle Bitbol [Bitbol 2000 - 2015] believes that quantum mechanics is compatible with the Neo-Cantian approach. He considers the position of Niels Bohr to be neo-Cantian in the broad sense of the position, the principle of complementarity of which he, however, criticizes as containing, along with quantum and classical notions. At the same time, Bitbol also gives a significant role to the second Wittgenstein philosophy in interpreting modern physics and understanding consciousness.

From our point of view, the best philosophical approach to consciousness, interpretation of quantum mechanics and physical theory in general is precisely the pragmatic Wittgenstein approach in the broad sense, which is actually a form of realism that overcomes traditional philosophical doctrines, including neo-Cantianism [Prissy 2008-2015].

This implies an unbiased view of the philosophy of late (and not only late) Wittgenstein, as it was often interpreted as linguistic idealism or relativism. In addition, one can agree with Joslyn Benoist that Wittgenstein is not a language philosopher (in the sense of emphasis on language itself), as it is generally assumed, but a philosopher of consciousness [Benoist 2012].

Unlike Bitball, we believe that it makes sense to say that quantum mechanics describes a reality independent of the subject. In this sense we share Einstein's view: "Physics is an attempt conceptually to grasp reality as it is thought independently of its being observed" (Einstein 1951: 81). The question, however, is what to understand by reality and its observation (we will also use the expression "reality measurement", which is introduced by Benoist (see, for example [Benoist 2017 L'adresse])). And what do you mean by quantum reality?

We understand metaphysical realism as a position that is decontextualized or, to put it another way, a position that substantiveizes what belongs to the ideal and therefore is not a substance. Platonism, which substancializes norms, is a kind of metaphysical realism. It imitates metaphysical object realism in relation to external reality, as if explaining itself.

In fact, a nonmetaphysical realistic approach to consciousness and quantum theory that accepts the existence of things independent of our consciousness, language, theories, conceptual schemes, and so on, is not only possible but necessary. In our opinion, this approach is contained in the philosophy of late Wittgenstein. Our position is close to that of Wittgenstein in the broad sense of Joslyn Benoit, who develops contextual realism and accepts a categorical distinction between the categories of real and ideal.

Wittgenstein writes about thinking (but this is also true for consciousness in a broader sense):

"Es ist nicht wahr, daß Denken eine Art Sprechen ist, wie ich einmal sagte. Der Begriff 'denken' ist vom Begriff 'sprechen' kategorisch verschieden. Aber natürlich ist das Denken keine Begleitung des Sprechens, noch sonst irgend eines Vorgangs." (It's not true that thinking is a kind of speech, as I once said. The concept of "thinking" differs from "talking" categorically. It goes without saying, however, that thought does not accompany speech or any other process). [Wittgenstein 1998, § 7.]

Benoist concretizes: "(...) Penser n'est rien d'autre qu'une facon de construire une norme sur le monde meme afin de déterminer ce qui est et ce qui n'est pas le cas" (Thinking is nothing but a way of constructing a norm in the world itself in order to determine what happens and what does not) [Benoist 2012: 73].

Thought, consciousness in the sense of "spirit", meaning, concepts, norms are ideal. That is, they are not substances in the image and likeness of real things. The latter acquire their identity only in the context, through the application or implementation of relevant norms (concepts) that allow their identification (in the case of natural objects) or implementation (in the case of artificial objects) [PRIZE 2018].

Philosophical problems of consciousness and quantum mechanics have much in common, as they are metaphysical problems arising from the substantiveization of norms, that is, transforming them into (ideal) objects.

That is why a philosophical analysis of quantum mechanics can be useful not only for developing a correct understanding of this theory, but also for understanding the nature of consciousness. And on the contrary, philosophy of consciousness, and also Wittgenstein's therapeutic method can be useful for the decision of philosophical problems of quantum mechanics. (Similarly, Wittgenstein's philosophy of mathematics helped him to explore the nature of language,

psychological phenomena and consciousness. For example, the paradigmatic examples of "life forms" for Wittgenstein are mathematical examples).

The main problem of the philosophy of consciousness is the problem of understanding phenomenal consciousness (in physicist or non-physicist terms (e.g. with the help of "phenomenal concepts")), or "difficult problem", which is considered as yet unresolved. They say that there is always an "explanatory failure" between "qualification" - a phenomenal quality - and any explanation of it (not necessarily physicalistic). This "failure" was also attempted to be closed by quantum mechanics. The analysis shows, however, that a purely reductionist explanation of consciousness within the framework of physical theory, without appealing to phenomenal experience, is impossible.

In fact, ignoring a categorical distinction between conceptual, which is ideal, and real - for example, phenomenal experience - is the cause of a pseudo-problem of explanatory failure. We can never literally compare the ideal and the real (as if they were two substances), in the literal (i.e., substantive) sense of "explaining" the real with the ideal. In fact, the "explanatory failure" is closed initially in the correct application of the concept (physicalist or phenomenal). The very existence of this concept presupposes the existence of paradigmatic cases of its uses, developed from experience and not detached from it. Therefore, the physicalist concept, if its use is not ultimately associated with a phenomenal experience, cannot identify the phenomenal experience. In this sense, phenomenal experience is not reducible, which, however, does not mean that it is not real or natural (not related to nature).

In other words, the problem arises as a result of the interpretation of the ideal (description or concept of experience) and real (the most phenomenal experience, consciousness) as being opposite each other and therefore belonging to the same category. The failure between them is treated as a substance and therefore appears to be insurmountable, for it is impossible to overcome the failure between the ideal and the (real) substance, i.e. to turn what belongs to the category of the ideal into what belongs to the category of the real. In fact, "failure" is a logical failure between a phenomenal concept and its application. This is a failure related to the conditions of application of the concept. Its elimination requires an understanding of the nature of concepts and the conditions for their application, rather than some positive metaphysical solution.

A phenomenal concept, that is, a concept that identifies phenomenal experience, is by definition developed in practice in its application to phenomenal experience. And by definition within the language game of its correct application the gap between it and the phenomenal experience is closed. In other words, the so-called explanatory failure is closed "pragmatically" and the explanatory failure problem is a pseudo-problem.[9]

As to the nature of the phenomenal experience, as it is real (the phenomenal concept is developed and applied in reality), it is possible to tell that it has physical (instead of some non-physical) properties in wide sense, but not physical - described purely by physicalist concepts. Purely physicalist concepts are not applicable to phenomenal experience.

The problem of satisfactory interpretation of quantum mechanics, with which the latter has encountered since its inception, is also considered to be unresolved. The main problem here is the "measurement problem", which is that the so-called reduction of the wave function describing the state of the quantum system is not subject to the Schroedinger equation. She just postulates to explain the observed values of physical quantities. It is essentially a problem of explaining the transition from potential to actual, from the potential results of measuring physical quantities to a specific result observed in experience.

Some physicists and philosophers try to solve the measurement problem metaphysically, adding to quantum mechanics formalism consciousness as something external.

For example, Wigner believes that consciousness affects the physical world [Wigner 1979]. Mensky suggests including consciousness in the theoretical description of a quantum observer [Mensky 2005]. Inspired by Whitehead's ideas, Stap develops the ontology of "creative acts" as spontaneous quantum-mechanical events of reducing the wave function. He believes that these acts have dual nature: conscious and physical. Consciousness does not explain the actualization of a particular physical reality, but is mixed with it [Stapp 1993; Bitbol 2000: 49]. (See the analysis of many other positions in [Bitbol 2000]).

The subjectivist and dualistic approach to the interpretation of quantum mechanics is a departure from science.

In fact, since it is about actualizing the potential, it is natural to turn to a pragmatic approach that takes into account what physicists do, how they apply the theory [Pris 2008; Bachtold 2009; Bitbol 1996-2018].

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[9] It seems to us that our anti-reductionist view of consciousness and the elimination of the "difficult problem" is close to that of Jocelyn Benoit and Michel Bitbol [Vepoit 2012, 2017; Bitbol 2000-2015].

A pragmatic approach goes hand in hand with Wittgenstein therapy. That is, first of all it is necessary to find out the logic of the concepts used. At the same time, it involves using the correct concept of reality, clarifying the nature of concepts and the nature of the relationship between concepts and reality. In other words, it is primarily the therapeutic analysis of problems that is required rather than their metaphysical solution. Ontological considerations are legitimate, but secondary and imply the limits of their applicability.

As a result, it turns out that the "difficult problem" of consciousness and the "measurement problem" in quantum mechanics have the same structure.

As we said above, the correct formulation of the "difficult problem" - the problem of understanding subjective (phenomenal) experience - is that there is a "failure" between a phenomenal concept (or description of experience) and reality - phenomenal experience. (The phenomenal experience itself has no conceptual structure. It's just a perceptible, that is, a perception, between which there is no distance and reality). The solution, or rather the elimination of the problem, is that "failure" is logical, not substantive. It was originally closed as part of a "language game" of applying a phenomenal concept. This refers to the Wittgenstein problem of following the rule. The role of the rule is played by a phenomenal concept that is used to "measure" reality.

One or another type of phenomenal experience or some singular phenomenal experience can be identified by means of a corresponding phenomenal concept, the application of which presupposes the presence of paradigmatic phenomenal experiences (this indicates the impossibility of a purely reductive physicalist approach to consciousness).

Similarly, there is a pragmatic solution to the measurement problem in terms of the Wittgenstein problem of following the rule in the case of quantum mechanics, which is not a literal representation ("reflection") of reality, but plays the role of the norm for measuring reality, identification or implementation of quantum phenomena. "Failure" between her and reality is logical.

The application of a norm, or the use of a rule, is a "language game" in which a quantum phenomenon is identified (or realized) - the very concrete, tangible thing. It is identified (implemented) in the quantum mechanical context of measurement. For example, the phenomenon of quantum-mechanical correlation of measurement results produced over a system consisting of two interacting and, consequently, tangled systems, is identified (or realized) only by means of quantum theory. There is no other, more "deep" explanation for correlation using hidden parameters.

In general, we interpret any physical theory as a "Wittgenstein rule", but not in the instrumentalist but realistic sense. It is a "rule" that is developed and rooted in reality, in its paradigmatic applications.

If at first quantum mechanics was considered a specific, "non-classical" theory, now, as it turns out, it is a paradigm of scientific theory. In retrospect, from a philosophical point of view, even classical theories can be considered as rules for measuring reality. In other words, any true theory implies a pragmatic dimension, appeals to action, not a simple "reflection" of a "independent" reality.

With this view, the role of consciousness becomes clear. "Consciousness" in the sense of "sensible", that is, unconceptualized perception, not the representation of reality, but reality itself (from the point of view of Jocelyn Benoist, there is no distance between perception and reality [Benoist 2011]). In this sense, it plays a role in closing the gap between theory and its application: theory applies to reality, implies its own paradigmatic applications and therefore perceptual experience. (On the contrary, consciousness as a norm (concept) for identifying the subjective, including the phenomenal, is ideal, like theory. Such consciousness can be called a "spirit".

However, one should not forget that the pragmatic "act" of applying the theory in question is not a substantive act. The logical "failure" between conceptual and real is initially closed within the framework of the corresponding language game of applying the concept (norms, rules) (identification of phenomenal experience, measurement of physical size, etc.).

In other words, the pragmatism in question is normative pragmatism. This is the pragmatism of language games governed by norms/regulations. It is within the framework of the language game that the mentioned "failure" is closed.

Normative pragmatism is developed in the work of Robert Brandom [Brandom 2011]. Brandom admits that late Wittgenstein is a normative pragmatist and naturalist. Brandom's approach, however, in our opinion, has its shortcomings. In particular, Brandom overlooks the study of his own phenomenal experience. Timothy Williamson also criticized Brandom's inferventional semantics [Brandom 2000].

As mentioned above, we are closer to Jocelyn Benoit's approach - his Wittgenstein "contextual" (or "normative") realism, according to which being is both purely physical (physical phenomena, objects, structures) and experience (consciousness) is contextual. Deontologization of metaphysically

decontextualized ontology helps to solve the problem of qualification and measurement.

In particular, the abovementioned neo-Cantian interpretation of quantum theory, proposed by Michel Beatball, in our opinion, can be improved precisely in terms of contextual realism. Michel Bitbold's categorical difference between norms and reality corresponds to the "balance", which within quantum mechanics is established between real "events", which he understands in the deontological sense, and "theoretical entities".

The pragmatic and contextualistic approach we propose suggests understanding the modality - relevance, possibility, necessity [Chain 2014 "Illusions..."], [Benoist 2017]. (See also Brandom's approach to modality and counterfactualities as part of his normative pragmatism (Brandom 2008).

We consider the modalities in our interpretation of the second Wittgenstein philosophy [Pris 2008; Pris 2015]. For us, the real possibility is the possible application of the Wittgenstein norm, such as physical theory [Pris 2008]. So the possibilities are real, but not in the sense of David Lewis' modal realism. Their realism can be understood within the framework of contextual realism as real possibilities of applying the norm and possibilities of transforming the norm itself [Benoist 2017].

Michelle Bitbol, in turn, proposes a pragmatic and modal interpretation of quantum mechanics axioms within the framework of "modal substitution realism" (realism related to possibilities) instead of ontological realism of material bodies [Bitbol 2015]. This approach has close links with our Wittgenstein approach and can be considered and modified in terms of contextual realism. In particular, as part of his approach, Bitbol proposes replacing the concept of a thing with that of an event which he deontologizes. We keep both concepts.

In fact, we agree with Beatball, any theory, not just quantum mechanics, has pragmatic and modal meanings.

The logic of the notion of possibility, and thus the relationship between this notion and the notion of probability, can be established based on the experience of the particular possibility. Bitbol, for example, refers to "experience options for possible" "irreversibility" and "mutual unavailability" of opportunities [Bitbol 2015].

This approach is related to phenomenological analyses of the concepts of the possible (e.g., Husserl) and the event (e.g., Claude Romano 1999).

The process of conceptualization and stabilization of experience, i.e. the emergence, on the basis of perceived (conceptualized) quantum reality and theory, is secondary. Quantum mechanics, like any true theory, presupposes such an area of stabilized (conceptualized) experience. Similarly, as stated above, understanding consciousness through phenomenal concepts implies a stabilized (paradigmatic) phenomenal experience.

That is, objects in the broad sense (not only visual objects, but also experience), their properties, relations between them, the laws they are repaired with ("laws of nature") are secondary. They are formed in reality, based on reality. It is the formation of the Wittgenstein "life form" and the corresponding ontology.

The correct understanding of modalities allows to establish that interpretations of quantum mechanics in terms of "many worlds" are erroneous. In particular, the metaphysical interpretation of Everett's approach, which introduces parallel worlds and the splitting of the observer's consciousness, is untenable. We fully agree with Joslyn Benoit that this kind of interpretation of quantum mechanics is bad (i.e. without rules) "baroque in physics". We proposed a Wittgenstein demystification of the metaphysical interpretation of the Everett interpretation [Pris 2016 Wittgenstein Demystification]. As part of his pragmatic and modal critique of Everett's metaphysical interpretation of the approach, Bitbol makes a similar conclusion [Bitbol 2015].

The concept of opportunity is associated with the concept of event, the study of which allows a better understanding of the nature of time, and therefore consciousness. Bitbol, for example, reveals the "logic of time" by deontologizing the event.[10] In particular, it interprets the nature of irreversibility of time as logical rather than metaphysical. This "logical" approach echoes that of Jocelyn Benoit. Both philosophers also criticized the representationalism and dualism of the modernist epistemology. At the same time, one rests on the analysis of physical theory and the other on the critique of phenomenology and analysis of the notion of reality.

The study of the bases of quantum mechanics and the nature of consciousness within the framework of contextual realism makes it possible to understand the origin of the problems faced by the traditional theory of cognition. False doctrines that require correction are the problem of access to reality, metaphysical representationism, subject-object dualism, metaphysical epistemic realism, correlationism, and other positions.

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[10] The connection between philosophical and mathematical approaches in understanding time can be illustrated by the example of the interpretation of time proposed by Alain Conne and Carlo Rovelli within the framework of the theory of quantum gravity, interpreted in terms of algebra von Neumann. The emergence of time within the framework of this approach is associated with space-time uncommutability [Connes 1994]. (See also [Rovelli 2011].)

Contextual Realism

As a primary fundamental concept, we choose the notion of reality. By definition, reality is what it is [Benoist 2014]. That's a categorical definition. It sets the logical status of reality, not its properties. There is nothing positive about reality as such. There's no point in building a theory of reality as such. It is possible, however, to study some types or areas of reality in a meaningful way. The ordinary reality that surrounds us (tables, trees, houses), physical reality (quarks, electrons, atoms, galaxies), mathematical reality (numbers, axioms, theorems), social reality (states, law enforcement systems, social statuses) and so on are different in nature. Nevertheless, they are real in the same sense, defined by the concept of reality.

The concept of reality is enriched by the historical development of mankind and the emergence of new types of reality. He can make some adjustments. Quantum physics makes adjustments to our understanding of reality. New types of social reality are also being revealed. For example, Maurizio Ferraris introduces "ontology of documents" [Ferraris 2014, 2015]. Some philosophers use the notion of information reality. And so on. At the same time, the concept of reality cannot change in the foreseeable future. Like we said, reality is just the way it is. And we're always repelled by an everyday reality that doesn't go away.

If the concept of "reality" could easily be changed or defined as we wish, it would no longer be a true concept of reality. The true concept of reality must be rooted in reality itself, not introduced theoretically. We need him. In order to really deal with reality, to act in the real world (and to act only in the real world), we must have a true concept of reality that does not lead us into an illusory world, does not block us in our actions, does not promote conformism and acceptance of the actual reality that surrounds us and generally requires change (this is particularly true for social reality). Realism suggests that the subject is engaged.

For example, the metaphysical representation of a (pre)certain reality of the "outer world" dogmatically fixes this or that identity of things, properties and relationships. Ascribing so-called intentional objects (red cap, unicorn, imaginary friend, golden mountain, etc.) to the status of real objects, as Markus Gabriel does, for example, creates an imaginary barrier between the subject and reality that prevents him from acting (in reality) and knowing (reality) [Gabriel 2015]. Platonic materialization of norms leads to the idea of the immanent imperfection and secondary nature of things in this world; the ideal (true reality) is never attainable. The phenomenological notion of autonomous phenomena (phenomena) that reveal themselves from themselves takes us away from reality

into the sphere of visibility and, ultimately, into the sphere of pure subjectivity [Benoist 2016 Logique].

The concept of reality implies a sense of reality that, according to some postmodernists, has been lost. This feeling is developed primarily in everyday experience, in practice. Perception and, above all, visual perception plays a fundamental role in its formation. What we perceive in everyday life through our senses under normal conditions is real. This statement is primarily semantic (we can also say: analytical, logical). That is, it refers to the very definition of what we call "real" and "reality". So scepticism is false. A skeptical question (doubt) can only be meaningful if there are indeed specific reasons to ask it.

It follows from the above that the understanding of perception plays a fundamental role in understanding the concept of reality. We will distinguish between intentional and non-intentional components of perception (some philosophers believe that perception is always intentional. We, however, reject this provision). To denote non-intrusive (components) perception, between which there is no distance and reality, we introduce the technical term "Feeling"[11]. Feeling is reality itself, belongs to the category of real. It is what it is. Figuratively speaking, the Feeling is the point of contact between the outer world (what is felt - the object) and the inner world (feeling). More precisely, this is the point of division of reality into the outer world and the inner world, which are secondary to the notion of reality - the Feeling. Subjective and objective worlds, ontology, intentional perceptual experience are secondary. The latter is, so to speak, a normalized, non-intense perceptual experience. Appropriate normality is its intentionality; norm is intentionality. This norm-intervention is developed in reality from non-intrusive experience. It's not imposed from the outside. It therefore depends on the context (specific circumstances) and is itself applied in context, correctly or not. In the case of correct application of the norm-intervention, it is considered to be "filled" (following Josslyn Benoist and our own views, we interpret the concept of "filled intention" of Edmund Huserl as correct application of the norm [Benoist 2007]). Thus, the contextual realism in question can also be called "intentional realism". It can also be called "normative realism" [Benoist 2011].

These are not metaphysical intentional or normative realisms, but contextual. Norms-intervention do not exist (real) in themselves, do not have autonomy and are not naturalized literally as part of natural reality. They are perfect in themselves, that is, they belong to the category of ideal, different from the category of real. They are only real in the sense that they are rooted in reality, that is, they have real conditions for their existence and application. Rootedness in reality means satisfying two conditions: appropriateness and adequacy. The first means that a norm has its area of applicability to which the norm must conform: truth is conformity (for example, the established physical theory, which we interpret as a Wittgenstein norm/rule, is true if it corresponds to its area of applicability). The second means the correctness of the application of the norm in its area of application. Obviously, the satisfaction of the second condition implies the satisfaction of the first.

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[11] We translate the French term "le sensible" as "perceptible" and interpret the relevant concept explored by Joslyn Benoist [Benoist 2013].

It should be noted that we will often use the terms "norm", "rule", "concept" as equivalent, interchangeable. So we can also talk about contextual "conceptual" or "semantic" realisms, again not in the sense of metaphysical. Conditions of suitability and adequacy are also conditions for true concepts and meaning. Pseudo-concepts and pseudo-sense are detached from reality. True concepts and true meaning are developed in reality and are fed by it. Reality is the ground for them. The idea of autonomous meanings, of meanings, so to speak, as "a State in a State" or a State outside a State" (the expression of Jocelyn Benoit) was spread in the second half of the 20th century in analytic philosophy. Such metaphysical "semantic realism" is, in fact, semantic idealism.

The emphasis in the expressions "contextual realism", (contextual) "normative realism", (contextual) "intentional realism", (contextual) "semantic realism", (contextual) "conceptual realism" and so on can shift from one word to another. We are talking about two inseparable aspects of contextual realism. A real thing can be *given* (by *data*) only within a certain point of view, description, intention (as a description format), application of a concept, norm or theory that does not create it, but identifies it (i.e. a thing does not exist *due to a* conceptual scheme and so on). Otherwise, the position would be idealism). That is our realism is intentional, normative, conceptual, semantic, contextual (things acquire their identity only in context). And at the same time, on the other hand, the very intention, norm, theory, point of view, conceptual scheme, meaning and so on are internal to this or that context and are rooted in reality. In a certain (not categorical) sense, they are real. That is, our intentional (normative and so on) realism is realism (concerning intentionality, norms and so on). We will also talk about the reality of context, or context as reality itself. Context is implied; it cannot be defined. Otherwise, it would not be the context, but a certain object. Within contextual realism, all real objects are rooted in context-reality. This allows them to vary their identity, depending on the context. As Jocelyn Benoit

notes, contextuality is a fundamental epistemological and ontological property of reality. What does not have that property is not real.

Later on, we will expand the concept of the perceptual experience of the Feeling to other and far-removed areas of reality, so that we will also talk about the Feeling in physics (for example, we can "feel" a reality fragment of subatomic particles), mathematics, social sphere and so on.

We ourselves are part of everyday, physical, social and other kinds of reality. As such, they are not conceptualized. We are only able to get this or that "access" to them if we have already developed the relevant concepts and mastered them, that is, are able to apply them correctly.

Physical reality as such is an unconceptualized physical Feeling. This is a physical Feeling, however, not always and not to anyone "given" - not in the sense of a given (definite) object (i.e. something that has an identity), but in the sense of a "given" unconceptualized (uncertain) fragment of physical reality (although the fact that we are talking about physical reality already presupposes a known minimal conceptualization with the help of physical concepts). Just a fragment of reality is not given to us, like a phenomenon or an object. It can be "given" to us or not in the sense that we can be in it, so to speak, contact with it or not. This "given" is a necessary condition for its subsequent conceptualization in a given context. Let us emphasize once again that the conceptualization we are talking about is not an arbitrary imposition on a fragment of reality of identity from the outside, but the identification of an object (identity) in it in this or that context. Our position is contextual realism, not idealism.

In order to be in contact with this or that fragment of reality, it is necessary to outline it beforehand conceptually. That is, every fragment of reality still presupposes a certain minimum degree of its conceptualization. Using Wittgenstein terminology, not only the existence of certain objects, but also the Feeling itself presupposes this or that "life form". Paradigmatic (real, rooted in reality and therefore "felt") objects are identified within the framework of the life form, as well as new (not predetermined) objects - things that before their identification, although real, had no identity. Identification of a new object is preceded by a "datum", which is not a datum of the object, but a simple presence of a fragment of the Feeling reality (however, as mentioned above, some minimal datum in this presence of the outlined reality fragment takes place), with which the subject comes into contact within the framework of the life form.

Let's give a few examples.

Identification of the Higgs boson as a real object ("elementary particle") as a result of the application of theory, numerous experiments, statistical processing of experimental data was preceded by some physical Feeling, the study of some reality fragment within the Standard Model and the practice of its application, which played the role of a physical life form. Outside of this life form, not only could the Higss boson not be given, "opened", but the corresponding fragment of reality, the physical Feeling in which the boson was found, could not be "given". The Higgs boson was not designed with theory and experience. That is, experience does not carry a "theoretical load". And it was not "open" in a metaphysical sense, as a certain object of the outside world. He's been identified, as mentioned earlier. As a result of the practical application of the theory in the context, he acquired identity.

The Tau-neutrino wasn't open "suddenly." And the concept of "tau-neutrino" was not defined immediately. It was formed gradually, both theoretically and by experience. That is, a fragment of reality was gradually outlined and clarified, in which later a taut neutrino was identified, and then finally established ("openly"). A brief history is [Blondel 2019]: The concept (and corresponding symbol) of a "tau neutrino" was introduced in 1977. The fact that the neutral particle present in the Tau decay, a neutrino, was proven in 1979. The existence of the Tau-particle as a third neutrino - Tau-neutrino - isospin partner of the Tau-lepton was finally established between 1981 and 1986. The properties of this particle were precisely determined in 1989 in experiments on electron-positron and proton-anti-proton collisions. The interaction of Tau-neutrono with matter was observed in 2000 [Blondel 2019].

Let's turn to an even earlier history of physics. Einstein and Infeld write [Einstein 1938: 157-158]:

> "In the beginning, the field concept was nothing more than a means to facilitate understanding of the phenomenon from a mechanical point of view. (...) Recognition of the new concepts was steady until the field concept eclipsed the substance concept. It was realized that something important had happened in physics. A new reality was created, a new concept for which there was no place within the mechanical description. Slowly and in the struggle, the concept field took a leading place in physics and became one of the basic physical concepts. For modern physics, the electromagnetic field is as real as the real chair on which we sit.

This transformation of concepts into full-blooded concepts that identify new and well-defined realities in physics is ongoing. It is known, for example, that Heisenberg did not believe that mental experiments with single atoms could be realized. Nevertheless, they have become a reality (see, for example, [Haroch

2006. 2007]). Similarly, the concepts of black hole, Higgs boson, gravitational waves and others have become reality. (For the history of the concept and the discovery of the Higgs boson, see, for example, [Iliopoulos 2013]).

Thus, a physicist can deal with one or another unconceptualized (if he does not have the necessary theory) fragment of physical reality. In the same way, one can deal with a fragment of social reality as such - the unconceptualized social Feeling. In the absence of concepts, theories, social phenomena can be perceived as social Feeling, as simple social reality in its own (ipseity). We can, for example, perceive the protest movement of "yellow vests" in France, but not yet understand it, not know how to conceptualize it correctly, that is to identify certain aspects of it (rather than arbitrarily impose its identity from outside). Is this movement a revolution? What are its real causes and what are the possible consequences? Is there any similarity between it and the protest movement in Venezuela or the so-called "color revolutions" in the post-Soviet space? And so on. This or that fragment of social reality (social Feeling) is accessible (initially, so to speak, in the "raw form", not in the form of certain social objects, phenomena, essences) to us only within the framework of this or that social life form. If we know nothing about revolutions, even raising the very question of whether the protest movement of "yellow vests" is a revolution will be impossible. Conceptualization starts where we ask a question and look for an answer, as a result of trying to answer the questions we are interested in and that matter to us,

For Heidegger, we don't just hear a beep or a car horn, but we hear directly (not indirectly) the beep of the postman's car. That is, we directly perceive it in its social dimension. This dimension could obviously be overlooked, for example, by a person who is not familiar with the way mail is delivered, by a foreigner or a child. In this case, the social sentiment would not be conceptualized as the horn of the postman's car, as a signal of mail delivery, but it would not cease to exist. Wittgenstein calls a person unable to identify certain aspects of reality measurement due to the lack of corresponding concepts "conceptually blind".

From a contextual perspective, you can look at any area of research where the question of reality arises. In particular, it seems to us that the reality of the past is also contextual. As Baro writes,

> " nous ne sommes pas responasables de ce qui s'est fait autrefois sans que nous puissions intervenir. Mais nous sommes responsables de ce que nous pouvons rendre présent et introduire dans l'existence. Les Stoiciens avaient bien compris cela. Ce sur quoi nous ne pouvons strictement rien ne doit nous inquiéter, meme s'il doit requérir notre attention. // Pour la nature

> il n'en ai pas fondamentalement autrement. Niels Bohr a repris, en l'appliquant au devenir naturel qu'étudie en particulier la Mécanique Quantique, la formulde de Kierkegaard "Nous sommes acteurs, et pas seulement spectateurs, dans le grand drame de l'Univers" (we are not responsible for what once happened without our intervention. But we are responsible for what we can do is real, bring into existence. The Stoics got that well. What is completely independent of us should not bother us, even if it should deserve our attention. // Things are not fundamentally different with regard to nature. Niels Bohr applied to natural formation, which is studied, in particular, quantum mechanics, Kirkegaard formula "We are actors, not just spectators, in the great drama of the universe") [Barreau 1988: 13].

Wheeler writes (quoted in French in [Bitbol 2019: 261]):

> "The Past" is a theory. The past has no existence, except that which is stated about it in the present. In deciding what questions our quantum registration equipment will pose in the present, we have an indisputable choice as to what we have the right to say about the past.

This or that piece of reality is what it is. I mean, he's got himself. But he has no identity if he's not conceptualized. Conceptualization is only possible in one context or another. Conceptualization is not an external, so to speak violent, act. It is, figuratively speaking, a movement in reality itself.

Depending on the context, the "same" fragment of reality may acquire different identities. Depending on the concepts applied to it (norms, rules), the choice of which depends on context (and the application of which also depends on context), it can change its identity. It doesn't mean that identity is imposed from the outside. Just the opposite: concepts (norms, rules) in context identify, in a reality fragment, an object whose identity thus depends on context. The identity of the real thing is not fixed once and for all. It is the infinite contextual variability of identity that makes it possible to say that something is real. In the words of Jocelyn Benoist, - let us repeat this again - contextuality is the fundamental epistemic and ontological property of reality [Benoist 2017].

So, objects arise in context, as a result of applying concepts. Together with the latter, they are rooted in reality, feed on it, can change their identity if placed in a different context. Real objects are tangible objects, things themselves. This is what exists. Reality itself is not an object. It does not exist in the sense of object existence. It's just there. In other words, reality is primary, ontology is secondary and contextual.

Anything that's not real will be classified as perfect. Concepts, norms, rules, meaning, language as a paradigm of any normality, we classify as ideal. The ideal is not located in some ideal Platonic world. It is not a substance to which there is specific contemplative-intellectual access. It makes no sense to have the ideal and the real "opposite each other", to compare them (as if they belonged to the same category or super-category). Perfect is "movement" in reality. It occurs when we do something with reality, practically or theoretically (cognition is also an activity). In particular, concepts emerge where differences arise, where they can be compared, identified, described, explained, and so on. But they are not, in themselves, some kind of special reality (an ideal reality).

Reality as such is meaningless not in the sense that we have lost or failed to find its meaning and not in the sense that it could have made sense but does not have it, but in the sense that it makes no sense to talk about its meaning. Reality and meaning belong to different categories. Reality as such has no fixed conceptual structure, conceptual (normative) dimension. Concepts, norms, meaning (semantics), knowledge (epistemology) are secondary and developed in reality. It is our task to develop and apply them. Ontology is also secondary to reality, as ontology is defined because what exists is identified by concepts (norms) in context. Ontology is context-sensitive. There's no point in saying that reality itself is context-sensitive. In a sense, one can say that context is reality itself (because rooted in reality is rooted in context).

Reality as such (Feeling as such) is silent, but it is not silent. On the contrary, the meaning is silent, but not silent. In the substrate of ideal meaning is the reality that feeds it and in which it is rooted (otherwise it would be pseudo meaning - an autonomous meaning in itself). The silent noise of the Feeling precedes the meaning and is a condition of its existence. One can only speak about the reality of (genuine) meaning in the sense of its rooting in reality, in the sense of the existence of real conditions for meaning, which can always (but not exhaustively) be defined. As we said above, contextual semantic realism can be understood exactly as rooted meaning in reality, not as its autonomy. Let's repeat once again that the accent can be made on both the word "realism" and the word "semantic". We are talking about two aspects of the same contextual position. This is semantic realism because what (really) exists, is given, assumes meaning, a semantic perspective. On the other hand, this sense (a semantic perspective) is rooted in reality (but not real in itself). So it's semantic realism.

The subject that develops meaning is itself formed as a result of this process and, more broadly, of the process of evolution. The process of evolution resulting in the subject is not just a process of natural evolution, but also conceptual, normative and linguistic. Together with norms, concepts, language and consciousness, it emerges in and out of reality. In reality, the subjectivity of the subject is rooted in reality; it is not modernist autonomous subjectivity, which 20th century phenomenology absolutizes: trying to get rid of the subject, phenomenology transforms the concept of a phenomenon (phenomenon) into an extremely subjectivist concept.

We're not out of reality. We are a part of it. We are constantly interacting with reality. Therefore, there is no problem of the subject's access to reality, as thought the philosophy of modernity (and postmodern, which generally rejected the notion of reality). Art Nouveau philosophy emphasized epistemology: the Subject is located outside of the reality he cognizes and cognizes it through representation. The modernist representationism claims that there is a mediator between us and reality - a representation (mental representation). Language also plays a role in 20th century philosophy). The representation as if played the role of a veil, which had to be overcome in order to get "access" to reality. Postmodernism has even questioned whether something exists behind this "veil". He identified our perceptions with reality itself.

In fact, as has been said, we are part of reality, originally in contact with reality. A point of view from the outside is impossible. In fact, we are always located within a certain "life form", which is nothing more than a set of language games that obey the same rule - "grammar" of the life form, which establishes family resemblances between language games. Our form of life can also be called an area of "everyday (both in the narrow and broad sense) meaning". This is an area of ordinary opinions, knowledge, obviousness. We accept Timothy Williamson's position that obviousness (in context) is complete knowledge (in context): obviousness = knowledge. This position applies to both science and philosophy. According to Williamson, philosophy is a systematic, theoretical, critical study based on reasoning and obviousness [Williamson 2019]. So she's a full-fledged science. Obviousness is never absolute, as logical empiricists, for example, assumed (for them, obviousness is the obviousness of the immediate sensory data, sense-data) or phenomenologists (for them, the phenomenon is self-evident). Mistakes are possible. But it's also possible to correct them. Scepticism is rejected.

Contextual realism in Wittgenstein terms

Jocelyn Benoit, developing her version of contextual realism, is inspired by the ideas of Ludwig Wittgenstein, John Austin and Charles Travis. The latter is a radical contextualist who considers himself a follower of Wittgenstein. Some philosophers reject Travis' radical contextualism and also deny that the term contextualism applies to late Wittgenstein's philosophy. According to our position, Wittgenstein can be called a moderate contextualist: his moderation is that the real possible contexts, language games are limited to this or that "form of life". In particular, our language games are limited to our form of life. In this (and only this) sense, language has a downtown - a form of life. (An example of Wittgenstein's opposite interpretation is the position of Robert Brandom, who believes that for Wittgenstein the language is so colourful that it has no downtown. As part of Brandom's analytical pragmatism, the language has a downtown character [Brandom 2008, 2011].)

We formulate the position of contextual realism in Wittgenstein's terms "language game", "rule", "family resemblance", "life form", philosophical "grammar", "axial sentence". Note that this is about our analytical interpretation. The essence of the Wittgenstein deflatzionist approach in the broad sense of the word is to reveal the logic of language and concepts. In turn, we discover the logic of Wittgenstein's own language and philosophy.

The language game is governed by the rule, there is the application of the rule (the concept thus allows to eliminate the problem of following the rule), i.e. it has a normative dimension, or "spontaneity" - Wittgenstein's term, which can be considered as generalization and naturalization (within the framework of normative naturalism as a kind of normative realism) of spontaneity in the sense of Kant - a purely intellectual (conceptual) ability of cognition. Wittgenstein's spontaneity can be understood as substantiation of a new authentic (correct) language game (application of the rule) post facto. Obviously, the rule (norm) applied in the language game itself serves as a standard of justification.

In other words, a language game is an action, practical (i.e. in its own sense) or theoretical (an act of cognition can be regarded as a cognitive action - a language game), - normalized (conceptualized) practice, i.e. a practice governed by a rule (norm, conceptual scheme). This is the application (use) of the Wittgenstein rule (norm, concept) in context. In particular, the judgment is contextual, there is a language game.

We can say this: A language game is, in general, a normalized mixture of things and language, material, natural, social and linguistic elements. It has a conceptual structure, meaning, while the reality itself, in which it is rooted and which feeds it, is "meaningless", just as it is. In this sense, according to Wittgenstein, meaning is use, that is, language game.

We call the Wittgenstein rule a language game rule, i.e. not an abstract rule, but a rule which is rooted in reality, context, language game, life form. This means that it is determined (in a circular manner) by paradigmatic (already normalized, i.e. obeying this rule) cases of its applications - established language games. Even the most primitive, "instinctive" language game has a normative dimension, there is the use of the rule.

Neither a purely intellectualist reduction of the rule to its abstract formulation (the position of Regulism) nor its reduction to irregular regularity (the position of Regulism) is possible. More complex language games and life forms are formed from simpler ones. But the simpler ones are also authentic normalized practices in which the subject participates and which arise as a result of the fact that the subject starts doing something, poses questions and tries to find answers to them. (It should be noted that, as mentioned above, the subject itself is formed on the basis of reality. He is not out of reality.) Based on the above, the Wittgenstein rule can be called "natural", "real". Conditionally speaking, it is "implicit" in reality, or more precisely, it is explicit or implicit in its language game.

A language game cannot exist in isolation, in a single copy. A language game, the rule that governs it, involves a whole family of language games, subject to the same rule. This is equivalent to having a "family resemblance" between them. We define the concept of family resemblance as follows: family resemblance is (in general, implicit) a general Wittgenstein rule (the concept of family resemblance is equivalent to the concept of the rule). In the case of a general explicit rule, we can simply talk about similarities. Language games together with their family resemblance form a "life form".

Thus, the concept of a language game already contains all concepts: rules (norms), family resemblance (equivalent to rule, norm), life form (equivalent to grammar, rule, norm, set of established language games). And vice versa: Each of these concepts contains all the others.

Language is the application of a rule/regulation in context. There is no extra-contextual application of a rule/norma/concept. This applies both to the definition of a rule/norm/concept and to the definition of context. The context is where the norm is revealed and where it is applied. And vice versa.

The language game as the application of the norm in context is a phenomenon that involves the difference between visibility and reality. If the application of the norm is correct, the language game is authentic, we are dealing with a phenomenon within which the true (real) thing is real. Otherwise, there is an illusion. A language game is not autonomous, it assumes context, it is rooted in reality. Her norm is superior to hers.

Within the framework of an authentic phenomenon, we are given the very thing - an object rooted in reality (in the broad sense, i.e. not necessarily a visual object), correctly identified by a rule/norma/concept.

The Wittgenstein rules (hereafter referred to as "the rule"), norms, concepts are categorised as ideal. They "measure" reality. As a result of correct application of the rule to reality, an authentic ("spontaneous", "natural" - Wittgenstein's terms) language game emerges. The failure between right and reality, the corresponding language game and the real object identified in the latter, is logical, not substantive. This is a "failure" between the categories of real and ideal, not a failure between objects belonging to the same category, i.e. between comparable objects. That's why it closes logically (they also say that it closes pragmatically, in practice): it is enough to take into account this categorical difference. This is how the Wittgenstein problem of following the rule is solved (eliminated).

In other words, the rule (norm, concept), as it was said, is determined by its paradigmatic applications. These cases do not contain any failure by definition. In case of new applications of the rule (norm, concept) the correctness of the application means the closure of the failure. Failure is closed if the language game is post facto justified. But the possibility of correct application of a rule (precise or approximate) refers to the very logic of the rule (norm, concept) and its application. No further (substantive) explanation is required as to how to close the gap between the rule and its application.

We are talking about the very concepts of the concept and reality, as well as about the general structure of the problem of following a rule (application of the concept, norm). The installations of this problem are a difficult problem in the philosophy of consciousness, the problem of measurement in quantum mechanics, the "problem" of complete formalization of mathematics and others. Ultimately, the correct understanding of these problems and their elimination presuppose the right understanding of the concept of reality, the right realistic position.

At first glance, it seems that full conceptualization (description, explanation) of the phenomenal experience, kualia (as it is felt, it seems "what it looks like"), is impossible. This illusion is the result of a mixture of the ideal category, which includes norms, concepts, rules, descriptions and the real category, which includes phenomenal experience. One cannot be turned into another by definition. One is not located opposite the other, that is, it is not comparable, does not belong to the same category. There's no failure between them. The "Explanatory Failure" is closed in the correct application of the phenomenal concept developed from experience, practice, which identifies this or that kind of feeling, perception and so on, or even this or that singular feeling, perception and so on (there are singular concepts that allow to identify a unique singular experience). Similarly, the measurement problem in quantum mechanics is eliminated (see below). Similarly, in mathematics, the Gödel theorems show that it is impossible to completely formalize mathematics, that is to say, the data of mathematical reality (whatever it may be) to pure formalism - normative.

Rules, norms, concepts "measure" reality. By definition correct, precise or approximate (one assumes another, one does not exist without the other), measurement is possible, and as a result of the measurement the real thing itself is measured, not its ersatz, representation or something else is identified. Similarly, thought measures reality, real things. You can't think of a thing without thinking of it. By definition, a thought is the thought of the thing itself (see below for more details).

It should be noted that reality measurement, i.e. rule application, is contextual. It permits an "error" defined by the context of the rule itself and its application (measurement). That is, there is a contextual limit to the accuracy of measurement, observance of which can be seen as an exact application of the rule. At the same time, the exact application of the rule may be more or less reliable. For example, in the physics of elementary particles, the accuracy limit at which the experimental observation of an elementary particle can be considered its discovery (acquisition of knowledge of its existence) is "five sigma". It is said that the Higgs boson was discovered (we know it exists) because its experimental statistical validation is five sigma or higher (the higher the knowledge: knowledge can be more or less reliable). In other areas of knowledge, the limit of accuracy can be different, for example "three sigma".

Similarly, the correct use of language in everyday situations depends on context. If in one context (for example in geometry lesson) the circle drawn on the board is not exact or is not even a circle (in context this is the norm of the circle, the norm of the allowed error at which the drawn figure can still be considered as a circle or an exact circle), then in another context it can be an exact circle. For Platonist, the ideal circle - precise, eternal, perfect, unchangeable circle - is in an ideal world. That's what really exists. The installation of the ideal is always close at hand. The error is that Platonist breaks off the norm of context, that is, he materializes it - he considers it in the image and likeness of the surrounding bodies (only unlike material bodies Platonist ideas consist of immaterial substance).

A thing is identified in a language game as a certain thing, that is, as an object given by thought. Tautology is that you can't think of a thing without thinking of it. And if we think of a thing, i.e. apply the concepts (norms, rules) correctly, we think of the thing itself, not of the thing for us, the "thing already conceivable" or something else. In other words, both correlationism claiming that we only have access to correlations between the subject and object, consciousness and reality, thought and thing, on the one hand, and not the subject, consciousness, and thought, on the other hand, and anti-correlationism claiming that correlation is surmountable, access to the thing itself is possible - access that as if overcomes the very thinking.

Both correlationists and anti-correlationists share the common false assumption that a certain substantive correlation really takes place and as if shades the access to the thing itself (the thing itself thus turns out to be either inaccessible by the thing itself, or not existing at all, or difficult to access or available in some specific way). They simply mix the categories of real and ideal, without taking into account the logic of language, thought, truth, object, reality and other concepts [Benoist 2017 "L'adresse ..."].

Taking this logic into account is the essence of the deflatsionist, i.e. non-metaphysical approach. The moderate deflazionism that we (and, as we believe, Wittgenstein and Jocelyn Benoit) support does not, however, deny the existence of things themselves and their cogniability. He also does not deny that norms (rules, concepts, language) are rooted ("implicit") in reality, overcome language games. They act as a "call of reality", which is not a phenomenon, does not show itself, but can be expressed in language.

The "correlation" of the subject (thought, consciousness) and the object (reality, nature) can and should be understood not metaphysically, but deflatsionistically as identification of the object by means of thought within the framework of a point of view. Outside of thought and point of view (and any thought is perspective - within a certain point of view) identification of an object, thinking about it is impossible. We can't think of an object without thinking of it. This tautology refers to the logic of thinking.

Truth, i.e. correct identification of the object (correct application of the norm) can be understood as the "correspondence" of thought and reality, language and reality and so on. Actually, it's a logical reconstruction. Already Aristotle (*Metaphysics*

Δ, 15; reference in [Benoist 2013: 208]) noticed that what is cognizable, thought and measured is in *relation in the* sense that it corresponds to cognition, thought and measurement. This attitude is not symmetrical; it can only be turned artificially. Appeal has the following form: truth, cognition, thought, feeling corresponds to the state of affairs (fact), what is cognized, thought, measured. For Aristotle, such treatment is a repetition; it is tautological. And it can be summed up in case of visual experience. To say that the latter corresponds to the object that is perceived in the experience - say the same thing twice. Finally, Benoit summarizes what has been said to any perception. It is the logical treatment of the asymmetric relationship between the perceived and the thought that creates the problem of the plot's access to reality through perceptual experience.

The correct application of the norm is truth as "conformity", rooted in reality. We can talk about literal correspondence if we are talking about correspondence between language and its established applications. In this case the language (norms, concepts) seems to be naturalized, its normality is invisible.

The life form, like all other Wittgenstein concepts, is therapeutic. On the one hand, life form is not a positive (meaningful) concept. There is no point in building a theory of life form, and the concept of life form does not explain anything. This concept is used within the framework of the deflatsionist approach, which reveals the logic of the use of our concepts and thus frees us from unnecessary (pseudo) metaphysics. On the other hand, deflazionism should not be confused with reductionism. Wittgenstein's position is anti-reductionist and anti-fundamental. The life form is not a certain abnormal, for example, a biological foundation devoid of social dimension. It consists of language games and has its own grammar.

Quantum mechanics and contextual realism

Let's consider an example of the simplest quantum system: a quantum bit - a system which can be in two states, 0 and 1, and also in linear superposition of these states. (The classic bit can only be in two states, 0 and 1.) An example (realization) of such a system is a system with a back ½. Let's take an electron for certainty.

As it is known, at measurement of a projection of a back of the electron on any axis z, observed value with this or that probability can be either - ½ (we designate a corresponding condition "0"), or ½ (we designate a corresponding condition "1"). The corresponding probabilities are determined by the Born rule: if the wave function has the form a "0" + b "1", where a and b are complex numbers, and all functions are normalized, the probability of getting the value - ½ is equal to the square of the module of the coefficient a when measuring the spin projection, and the probability of getting the value ½ is equal to the square of the module of the coefficient b when measuring the spin projection.

If the system was initially in the state "0" (in this case a = 1, b = 0), the measurement of the projection of the back on the z axis with a probability of 1 will give - ½. If the system was originally in the state "1" (in this case a=0, b=1), the measurement of the projection of the back on the z axis with the probability 1 will give ½. Such states are called eigenstates of the projection of the spin, which is an operator in 2-dimensional Hilbert space, consisting of linear combinations of his eigenstates. If the system was in the superposition of these two states, a "0" + b "1", with the same weights, for example, a=b=1/.$\sqrt{2}$then the measurement of the projection of the back on the z-axis will give either ½ or ½ with the probability of 1/2. In this case the system will go either to the "1" or "0" status. Irreversible stochastic reduction of the wave function: a "0" + b "1" → "0" or a "0" + b "1" → "1" is not described by Schrodinger's equation. This is one of the formulations of the so-called "measurement problems" in quantum mechanics.

Within quantum mechanics, probabilities are not epistemic, that is, they are not conditioned by our ignorance of the real state of affairs. Before the measurement, the projection of the back on the z-axis had no definite meaning. What's more, there's no point in talking about its specific meaning before the measurement. Quantum ontology is different from classical. This is the ontology of "dispositional background" - a term that is increasingly used in the analysis of philosophical problems of quantum mechanics - the ontology of potentials.

That is, unlike classical mechanics, in quantum mechanics there are no predetermined values of physical quantities. The theory is that there's no point in even talking about predestination.

Even when the system is in its own state of "0" or "1", and, consequently, the result of measuring the projection of the spin is predetermined with mathematical probability 1, this predetermination is not epistemic. If we deal with a single system and make a measurement for the first time, as it follows from the theorem of impossibility of cloning, its value cannot be epistemically reliable. Otherwise, we could know what state the system is in and thus clone it. (As Michelle Bitbol reminds us in his book The *Practice of Possibilities*, there is a difference between reliable prediction and prediction with probability 1 [Bitbol 2915: 331].

They say that the wave function, including its own function of the physical quantity operator, suffers from the lack of objective reality: it is not predetermined, so to speak, but can be defined in a statistical context, when it is possible to make measurements on its identical copies. In the case when we are dealing with only one single instance of a quantum system in the pure state ψ, which may be represented as the eigenstate (with eigenvalue 1) of some projector, the function ψ is known only to the experimenter who prepared it, but cannot be known to an outside observer. In fact, as a result of the measuring system, the system changes its state in an unpredictable and irreversible way. In this case, part of the information about the initial state is irreversibly lost. The experimenter only gets partial information about him. (The consequence of the lack of objective reality in the wave function is the impossibility to accurately copy (clone) an unknown state (no-cloning theorem).

Thus, one should either acknowledge the existence of a reality that is unrecognizable from the point of view of an observer who was not involved in the process of preparing the wave function, or acknowledge that the latter reality implies the presence of an "interacting" subject - observer: regardless of the observer, the wave function cannot be considered objectively real; quantum reality is the reality of the act of preparing the state of the system.

In fact, in our interpretation, we are not talking about the interaction of the observer and the quantum system,[12]but about measuring the physical size of the

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[12] In our opinion, one of the disadvantages of the interpretation of quantum mechanics called "Cubism" (Qbism) is that this interpretation interprets measurement as the interaction of an observer ("agent") with the quantum system ("reagent"). Thus, on the one hand, the quantum system is as if real (but otherwise what does the observer interact with?), and on the other hand, the observer measures only the result of his interaction with the quantum system. Within Cubism, the observer and the observed quantum system are two parts of a single whole [Fuchs 2018 "Notwithstanding Bohr..."], [Baeyer 2016].

quantum system by the observer in this or that context. Outside the context, the physical quantity has no definite meaning. The Born rule defines not so much the probability of "reduction" of the wave function (this reduction is purely mathematical) as the probability of transition when measuring the physical quantity in a particular context. Even if the mathematical probability of transition to some context is 1, before the actual measurement it makes no sense to talk about a certain value of physical quantity.

Thus, the concept of "wave function" cannot be considered a concept in the classical sense. It is a "quantum concept", the functioning of which implies the presence of an "observer", a point of view. In quantum theory, concepts do not function as a means to represent the metaphysical reality of objects existing independently of the observer, but as rules for the "interaction" of the observer with reality and the formation of the observer's secondary classic "metaphysical reality" of physical quantities having certain and predetermined values of physical quantities. (More precisely, from our point of view, this is a measurement in context, not an interaction. (See below)) The understanding of quantum mechanics should, thus, consist not in understanding of quantum concepts on manners classical that is impossible, and in understanding that such understanding is impossible, that quantum concepts differ from classical concepts on a way of functioning.

In favor of inapplicability of representations of classical ontology even in the case of mathematically predetermined values of quantum physical quantities, when the system is in their own states, we can also give the following argument.

Let us assume that all coefficients in some superposition of eigenvironmental wave functions of physical quantity, except for one, are very small. Then the approximate own value corresponding to the "big" superposition is almost predetermined in the mathematical sense. Assuming that it is predetermined and ontologically, it would contradict the point of view that in case of superposition the values of physical quantity are not predetermined and there is no sense in even talking about their predeterminacy. Consequently, even if the system is in its own state of physical quantity operator, but we are not aware of it, the corresponding own value cannot be considered as predetermined. On the contrary, if we ourselves have prepared the system in this state, that is, we know that it is in it, it is correct to say that the physical value has a certain value.

So, from our point of view, quantum epistemology and ontology are contextual in this sense. It is only after the result of the measurement that we move with probability 1 to the corresponding context that we know that we are in this context and that the projection of the back has a certain meaning.

Interoperable quantum systems are described in quantum mechanics by means of a wave function belonging to the tensor product of their gilbert spaces. For example, quantum interaction of spins of two electrons is described in the general case of tangled volnovoy function, containing inseparable components of spinovyh volnovoy functions of both electrons. Such inseparability (confusion) is the reason for the quantum correlation between the measured values of spin projections for two electrons, for in fact we are not dealing with two, but with one system. All measurements are thus made above the system as a whole. The so-called correlation is not a correlation between two physical quantities relating to two different systems, two events, but a correlation between numerical values obtained as a result of measurements made over the same system. Michelle Bitbol writes that quantum mechanics are a-local, not non-local [Bitbol 2015: 329-330]. That is, instead of "non-locality" it is better to talk about holisticism, or inseparability.

If to consider that quantum mechanics is the universal theory, it is necessary to take into account also interaction of quantum system with the device and the observer ("observer" can be attributed to "measuring device") and, perhaps, to apply quantum mechanics to the description of the whole universe.

In fact, such a "global" approach is similar to an attempt by sceptics to positively justify the existence of the "outside world". The global approach overlooks the fact that epistemic rationality, including cognition of physical reality, is always local in the sense that justified and unfounded opinions, true and false opinions, knowledge and ignorance always assume a system of axial proposals, which in practice are simply assumed, that is, play a logical role (their reliability is logical, not epistemic).

We can also talk not about the "localness" of rationality, but about the fact that it is not purely intellectual. The correct understanding of epistemic rationality as rooted in epistemic practice allows to eliminate the skeptical problem which the skeptic is trying to solve in a purely intellectual way [Prissy 2018].

The knowledge of physical reality, including quantum reality, must also suggest something. At the analysis of quantum phenomena the quantum theory itself concerns to logic system of "axial sentences", plays a role of Wittgenstein rule. But, of course, it's not just her, that is, not just the mathematical apparatus. The application of theory introduces the measuring instrument (and/or observer), which thus also plays a logical role (see below for more details).

The device and the observer can be attributed to a quantum system, but then it is necessary to enter another device (and/or another observer), which will play a logical role.

Suppose that the (normalized) wave function of the system's electron spin is a superposition of its two (normalized) states: the state in which the projection of spin on the z axis is equal to ½ and the state in which the projection of spin on the z axis is equal to - ½. Then the probabilities of obtaining, when measuring the projection of the back on the z-axis, values ½ and - ½ coincide with the squares of the modules of the corresponding coefficients in the (decomposition) wave function of the system. Suppose these probabilities are the same and equal to 1/2.

Let us now take into account the presence of a measuring instrument and an observer that interact with the quantum system. As a result of measuring the projection of the back on the z-axis, the tool with the probability 1/2 shows either the value ½ or - ½, and the observer with the probability 1/2 observes either the value ½ or - ½, respectively. Thus, in accordance with the law of unitary evolution in the process of measurement the initial tensor product of the three wave functions (system)⊗(instrument)⊗(observer), where (system) is a wave function of the spin system - the spin of the electron, (instrument) is a wave function of the instrument and (observer) is a wave function of the observer, and the symbol '⊗' denotes the tensor product, is transformed into the next superposition of the tensor products:

$\frac{1}{\sqrt{2}}$ (spin system +½)⊗(spin tool +½)⊗(spin observer +½) + (or -) $\frac{1}{\sqrt{2}}$ (spin system -½)⊗ (spin tool -½)⊗ (spin observer -½), which, for example, (spin observer +½) has a wave function of an observer observing the result of ½, and so on. (It is assumed that quantum mechanics is universal, i.e. applicable to both the macroscopic instrument and the observer). The structure of this superposition is preserved in time.

The above function is called confusing because it cannot be represented as a tensor product of wave functions of two systems. It illustrates the concept of "relative state" introduced by Everett [Everett 1957]:

> "We can't say that a quantum system sub-system is in any one well-defined state, regardless of the rest of the component system. Each randomly selected state of one system will correspond to a single relative state of the rest of the component system. (...) Such correlations between systems arise whenever the systems interact. "It is pointless to ask about the absolute state of the subsystem - you can only ask about its relative state in relation to the given state of the system residue. "A discrete "leap" into one's own state is thus only a relative statement that depends on the way the full wave function decomposes into a superposition, and is relative to

a specifically selected apparatus-coordinate value. As for the full theory, all elements of the superposition exist simultaneously, and the whole process is completely continuous.

For our case, in the confusing wave function of the states (spin system + ½), (spin tool + ½) and (spin observer + ½) are relative to each other, as well as mutually relative states (spin system - ½), (spin tool - ½) and (spin observer - ½). We will say that they treat each other in appropriate contexts.

The Everett interpretation (in the broad sense, but not the interpretation of Everett itself, which in our opinion is not metaphysical) says that in one "world" the observer observes (the tool shows the system has) spins 1/2 and in the other - (-1/2). The split into two worlds (or into two consciousnesses, if the matter concerns the interpretation that introduces many consciousnesses) occurs at the moment of measurement.

According to our interpretation, at the moment of measurement there is not a splitting of the world or consciousness, but a transition to this or that context in which a certain quantum correlation is already predetermined.[13] Outside the context, a certain correlation is not predetermined, only the correlation itself is predetermined. Moving into one context or another corresponds to the choice of coordinate system (point of view); it is not a physical process. In that sense, the word "transition" isn't exactly good. An observer simply discovers that he or she is in a certain context, within a certain point of view (in this case, unlike in classical physics, he or she cannot choose his or her context and cannot return to the original position)[14]. If the "coordinate system" is fixed, the correlated value of the physical quantity is fixed. So the quantum correlation is "coordinate". It is coordinate both in the sense of the initial choice of the "coordinate system" and in the sense of the coordinate dependence of correlated physical quantities at a fixed choice of the initial coordinate system.

Note that while we talk about quantum correlation as a "coordinate" correlation rather than a physical correlation, we reject not the causal correlation in general, but the classical causal correlation that occurs in a predetermined metaphysical reality. Obviously, the emergence of the correlation is obliged to the initial (and, accordingly, subsequent) interaction of quantum systems. This interaction can be considered as a reason for non-classical (quantum) correlation. From a formal point of view, the role of cause is played by a confusing wave function. Taking into account the above, we will also talk about quantum correlation as a "causal-coordinate" or "coordinate-coordinate" correlation.

Thus, we believe that contextual realism provides the most adequate interpretation of quantum mechanics.

It should be noted that Karakostas writes about "contextual realism" in a sense close to what we attach to this term, in relation to quantum mechanics:

"The context-dependency of quantum objects does not contradict a realistic view of the world as usually assumed. Scientific realism and quantum nonseparability are not incompatible, but the relationship between them points to the abandonment of the classical conception of physical reality and its traditional metaphysical presuppositions, most notably, atomism and strict ontological reductionism. Due to the essentially context-dependent description of reality suggested by quantum mechanics, one ought to acknowledge that the patterns of nature emerge and become intelligible through the active participation of the knowing subject that, by itself, is not and cannot be perspective-independent. In this sense, the conceptualization of the nature of reality, as arising out of our most basic physical theory, for a kind of contextual realism that we call active scientific realism". (Dependence on the context of quantum objects does not contradict the realistic view of the world, as is usually considered. Scientific realism and quantum indivisibility are not incompatible, but the relationship between them indicates that the classical concept of physical reality and its traditional metaphysical assumptions, especially atomism and strict ontological reductionism, should be abandoned. Thanks to essential dependence on a context of the quantum description of a reality, supposed by quantum mechanics, it is necessary to recognize that natural objects arise and become meaningful through active participation of the cognizing subject which in itself is not and cannot be independent from perspective. In this sense, the conceptualization of the nature of reality arising from our most fundamental theories requires contextual realism, which we call active scientific realism) [Karakostas 2004] (in manuscript P. 20).

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[13] Each context has its own particular reality. As Everett writes about quantum correlation, "From the present viewpoint all of these superposition are equally "real." Only the observer state has changed, so as to become correlated with the state of the near system and hence naturally with that of the remote system also. The mouse does not affect the universe - only the mouse is affected." (In terms of real, all the elements of this superposition are equally "real". Only the observer's state changes, so that it correlates with the state of the nearest system and, therefore, naturally also with the remote state) [Everett 1957 Dissertation: 116-117].

[14] From the standpoint of our theory, it seems to us that it is not so much the system that is affected by an observation as the observer, who becomes correlated to the system." (In terms of real theory, it is not so much the system that is affected by the observation as the observer begins to correlate with the system) [Everett 1957 Dissertation: 116].

Everett's Theory of Relativity and Quantum Mechanics

From the point of view of contextual realism, as we understand it, in Einstein's theory of relativity, each reference system can at first be considered as a point of view of reality, allowing to identify some of its section, measurement. In one reference system we have some lengths and time intervals, while in another we have other intervals. In one countdown system, two events are simultaneous, while in the other they are not. The reference system defines a point of view, perspective, context. On the other hand, there is a broader context in which points of view are compared. That's a point of view, too. In its frameworks the reality is a reality of own times and lengths, and measured times and lengths in moving systems of readout are considered as coordinate, conventional times and lengths, communication between which is established by means of Lorentz's transformations. In other words, in a new global context initially real physical quantities turn into conventional descriptions of the same from the different points of view (in different reference systems). In the special theory of relativity events - points in 4-dimensional space Minkowski - and tensors of physical quantities (instead of their components in this or that reference system) appear real.[15]

In STO the "correlation" between physical quantities in different reference systems is co-ordinate in the context of measurement,[16]not physical (material). We can say that its "cause" is the Lorentz transformation (corresponding symmetry or corresponding 4-tensor).

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[15] Our position can be seen as a contextual reinterpretation (or even correction) of Kit Fine's "fragmentalism" position, the existence of which we learned about after we came to similar views ourselves [Fine, 2005; Lipton, 2018]. In particular, Fine speaks about the pluralism of physical space-time: "According to the standard point of view, STO shows that space-time is a space Minkowski, not Newton; physical processes should be considered as occurring within the space-time, which has the structure of Minkowski, not Newton. However, from the point of view of the present, STO shows that it is not Newton's idea of space-time that is erroneous, but the idea that there is only space-time. Thus, we must portray physical processes as occurring in a multiplicity of physical spaces-temporal localisations, each of which has a common ontology of space-time localisations and each of which is Newtonian in its own structure and at the same time differs from others in its own spatial and temporal relationships between space-time localisations" [Fine, 2005: 306]. In contrast to Fain, we believe, however, that what we have in common in this example is not ontology, but fragments of reality, in particular unconceptualized "events". Ontology - what really exists - depends on context.

[16] That is, the measurement of the physical quantity depends on the choice of the reference system (measurement context). We can measure it in one reference system, and we can measure it in another reference system. In this case, the order of measurement is not essential. We can always go back to the original reference system, to the original context, and we will get the same measurement results. (In quantum mechanics this is not true.) But once the reference system in which the measurement (context) is made is fixed, the measurement of the same physical quantity in another reference system is predetermined: there is a coordinate correlation.

Everett carries the idea of relativity into quantum mechanics. In quantum mechanics the role of Minkowski's space plays the Hilbert space. The base of vectors (wave functions as eigenfunctions of some physical quantity - a self-conjugated operator) in Hilbert space plays the role of the reference system in the theory of relativity. Unitary transformation plays the role of symmetry transformation. Quantum physical quantities are represented as matrices in different reference systems. The correlation between the components of these matrices in different reference systems is coordinate. At the same time, in contrast to a service station, measuring these components in a single reference system means that they are irreplaceable in the corresponding context. If the coordinate basis in the Hilbert space consists of the eigenfunctions of the physical quantity operator P, only eigenfunctions P can be observed in this basis[17] with the probabilities defined by the Born rule. A quantum event as a measurement of a specific P value can be seen as a measurement in context (or as a transition to context). The measurement result is not predetermined. In contrast to the classical case (physical values are predefined and can be measured in any order). Quantum transition from absence of predetermination to certainty, according to this point of view, is not a physical process, but actualization (realization) of this or that value of a physical quantity.

Taking into account the above mentioned and specified analogy, the so-called quantum correlation (EPR-paradox) too can be treated as a coordinate (instead of physical) correlation. Its "cause" is wave function.[18]

Indeed, in a tangled quantum system it is impossible to distinguish independent subsystems (wave functions of subsystems). So, strictly speaking, you can't talk about subsystems. In other words, as Everett writes in his article, the wave function of one subsystem can be selected at will. The wave function of the other subsystem will be determined in relation to the already selected wave function of the first subsystem, so that taking into account all possible choices (contexts) the wave function of the complete system will remain unchanged [Everett, 1957]. This relativity is similar to the dependence on the choice of the reference system in Einstein's theory of relativity. It is senseless to ask about the absolute state of the subsystem (absolute context, absolute coordinate system in the STO). One can only ask about its relative state, i.e. its state in relation to the given state of another subsystem. Physical quantities have different values in different reference systems (contexts), but there is a connection between their values in different reference systems [Everett 1957]. At the same time, the measurement results in the actualization of a point of view. In this sense, quantum reality turns out to be "fragmented" (see footnote 1), or, more precisely, contextualized.

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[17] This is the context of measurement - P is measured in the order in which it is measured. If, say, Q does not commute with P, then measuring first P and then Q is not the same as measuring first Q and then P. Quantum mechanics is not commutated. Unlike the commutation service station, the measurement order plays a role.

[18] We take the word "reason" in quotes. It is possible, however, to speak about the reason in a literal but wide sense. Quantum correlation is not a correlation between autonomous events of "external reality" - so to speak, events in the metaphysical sense. It's a correlation between the results of observations.

A measuring device, if it is considered (used) exactly as a measuring device, cannot be considered as interacting with a quantum system. He's measuring it. Measurement as such is not an interaction, because by definition, together with theory and concepts, it belongs to the category of ideal, normative rather than real. Therefore, the "reduction" of the wave function of the system is not a real physical process.

If we consider the interaction of a measuring device and a quantum system, the first loses its status of a measuring device used by the subject making the measurements, and to make a specific measurement we have to introduce another measuring device measuring the interaction of the original device with the quantum system. Regress stops logically because we are moving from the real to the ideal area: measurement is treated as measurement, not interaction.

In particular, in the case of measuring quantum correlation, it is not the physical transformation of the original quantum system, but the transition to a possible context in which the "correlation" is already predetermined. Correlation as such is always predetermined. Specific values of correlated values, i.e. the context of the correlation, are not predetermined. However, in the context, they are also predetermined.

A pragmatic look at Everett's interpretation

We proposed a pragmatic "demystification" of Everett's interpretation (more precisely, its metaphysical multi-world interpretation) in terms of quantum theory as a Wittgenstein rule (hereinafter: c-rules) (norms) and its application [Prissy 2016]. A pragmatic view of Everett's interpretation was also suggested by Michel Bitbol [Bitbol 2015].

For Everett, all "branches" of the superposition of their own functions of physical quantity are "actual" and do not affect each other. None of them is more real than the others. That is, there is no need to assume that in the process of measurement, all but one branch is destroyed. This means that within Everett's quantum meta-theory "external observer", the Born probability axiom and the transition from "possible" to "actual" are absent. The Bourne rule is not postulated, but is derived based on the weights of the superposition components and symmetry considerations. (Note that Everett's proposed conclusion to the Bourne rule is not satisfactory.) Statistical interpretation of the theory is secondary: "Formalism proposes to build a formal theory first, and a statistical interpretation later" [Everett 1957].

In essence, Everett's original approach is to simply state that the result of a possible measurement is relative: it depends on the choice of the observer.

Metaphysical interpretation of this analytical observation introduces into consideration the plurality of parallel worlds, in each of which one or another measurement result is observed (or plurality of parallel consciousnesses, each of which states one or another measurement result), and each of which has the same ontological status (see, for example, [De Witt 1973]). Such approach is accompanied by traditional semantic, extensive interpretation of modalities in terms of possible worlds. It does not solve the measurement problem.

Metaphysical problems of interpretation of quantum mechanics are eliminated if to take into account language pragmatics and ordinary and scientific practice of the person. In fact, the transition from the possible to the actual refers not to theory, but to its application, that is, the pragmatic-practical level, or the level of "measuring" reality. Using our terminology, theory as a rule (concept, norm) does not apply to something specific, which is "in the outer world", but to reality. It just applies. It has already been applied in the relevant language game in some context. Transition from one language game to another - transition from one context to another. The object to which the theory applies as a c-rule is secondary. Its application to a predetermined object is a rational reconstruction or a well-established language game. Within the framework of correct application of the theory (rules, norms, conceptual scheme), the gap between it and the corresponding language game is initially closed. And this is true for any language game governed by this rule.

Similarly, as a result of its pragmatic reinterpretation, the interpretation of Everett can be demystified [Princess 2016]. This is consistent with Everett's conclusion that many of the paradoxes of quantum mechanics are fictitious and within its meta-theory become clear and disappear: "Fictitious paradoxes like that of Einstein, Podolsky, and Rosen (...) are easily investigated and clarified within the present scheme" [Everett 1957].

A similar "pragmatic-pragmatic" and "pragmatic-modal" approach to the interpretation of Everett "in terms of pragmatics of configurations of intersubjective expectations" and "parallelism of objectivistic and performative (pragmatic-pragmatic) settings" suggests Bitbol [Bitbol 2015: 6].

For Bitball, quantum theory does not describe external reality, but represents a set of rules for predicting possible effects of interaction with reality, experimental activity (for us, recall, the theory - in rule/normal). The difficulties in understanding quantum mechanics are due to the fact that it is considered within the classical epistemological paradigm [Bitbol 2015]. In particular, the problem of quantum time moments, events (Schrodinger's equation does not establish such a time moment) is eliminated: the time moment is determined within the performative setting [Bitbol 2015]. (In our terms, this means that the moment of time of the quantum phenomenon refers to the linguistic game of applying quantum theory. Thus, the moment of time at which a quantum event occurs has nothing to do with quantum theory.)

The pragmatic approach implies a new paradigm of knowledge, elements of which can be found already at Bohr. It does not introduce a fixed line of demarcation between the observed and the observer, there is no dualism of the cognition subject and the cognition object located opposite it [Bitbol 2015: 426]. Everett's interpretation fits this paradigm in the most natural way.

The metaphysical point of view "from outside" is more of a meta-theoretical reconstruction. In fact, even a simple visual observation of an ordinary object, such as a house, is promising. Surveillance by its very nature, by definition, is

promising. The hypothesis of the existence of a point of view that absorbs all possible points of view is a theoretical construct [Benoist 2016B Realismus und Metaphysik].

The theory, including classical mechanics, is applied to reality every time within the framework of this or that "language game", this or that perspective, which does not obscure the object being studied, but reveals one or another aspect of it. Some absolutist hopeless glance is impossible from nowhere, it makes no sense. And this is not because, as Kant thought, we are "finite", but because any cognition, any thought of something by definition is cognition, a thought within a perspective, a point of view. (This position is argued for example by Joslyn Benoist [Benoist 2016 B]. See also [Benoist 2016 A, 2017]).

In quantum mechanics the told is shown most clearly as it is impossible to observe simultaneously a condition of quantum system in different "reference systems", from the different points of view: the choice of one point of view excludes a choice of another. In other words, this or that particular result of measuring physical quantity implies a certain "reference system", point of view, of the observer. An observer, so to speak, can't be separated from him.

In a way, it's the same in the classic case. For example, within the framework of the special theory of relativity from the point of view of different inertial counting systems, the lengths and time intervals between the two events are different. There's two ways to go about it. In one metacontext (from the same (meta) point of view) we really deal with different (contextual, i.e. depending on the choice of the reference system) realities - different lengths and time intervals. On the other hand, in the metacontext of (meta)comparison of different reference systems, we deal with the same reality (two events) described from different points of view, between which it is possible to establish a correspondence using the Lorentz Transform.[19]

The only difference from a quantum case is that there can be an unambiguous transition from one point of view to another.

An observer (quantum or any other) is not subjective. It's an objective condition. Here it is appropriate to refer to Aristotle, for whom the phenomenon (phenomenon) has the following "grammar": the phenomenon is the phenomenon of something, of someone, somewhere, once and somehow. "(...) What appears to exist is not [in general], but only for the person to whom it is presented, when, how and under what conditions it appears". [Aristotle, Metaphysics, G (fourth), 6, 1011a23-24.] (Electronic link: http://lib.ru/POEEAST/ARISTOTEL/metaphiz.txt.) The quantum phenomenon assuming measurement of quantum physical quantities is not an exception.

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[19] Similarly, from one point of view, the table is a macroscopic object (this is one reality) and from the other a set of atoms (this is another contextual reality). At the same time, from the third point of view, we deal with the same object (the same reality), described in two different ways: macroscopically and microscopically.

The difference between classical and quantum mechanics can be presented as follows. In classical mechanics, "measurement result" adds nothing to its ontology. The observer just passively captures what's there. If the result of a measurement shows that a physical quantity has a value of both, it is assumed that this value existed even before the measurement. In this (and only this) sense, she does not depend on the observer. In this sense, and only in this sense, we can speak of a mutual correspondence between the classical language of description and classical ontology.

In quantum mechanics, "measurement result" has a different status. It is an event that exists, so to speak, only in its relevance. In general, it makes no sense to say that the value obtained as a result of measuring the physical quantity existed before the act of measurement. We can only talk about the reciprocal correspondence between the wave function and the quantum system it describes. But even such a representation is contested. Strictly speaking, the wave function "corresponds" to a quantum system only in the context of its preparation. The wave function is perfect, and the quantum system is real. Therefore, in isolation from the context of using the wave function, it makes no sense to talk about the correspondence between them.[20]

A pragmatic approach allows it to better understand the status of an "event" and, in particular, the "event" that effectively arises in a laboratory experiment.

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[20] Bas van Fraassen makes a similar argument against the correspondence of theory and reality in favor of his constructive empiricism.

Quantum event

The unconceptualized singular reality fragment has ipseity, but it has no specificity, i.e. it cannot be characterized in any way. For example, this particular table is not just a fragment of reality, but a fragment of a conceptualized (identified) reality. It's characterized as a "table". For a person who has never seen a table in his life and does not have a concept of a table, he can only be a fragment of reality about which nothing or almost nothing can be said and, therefore, one way or another to use. Nevertheless, the unconceptualized thing, though losing its identity, does not cease to exist.

A fragment of reality (the same table) may have a minimal, for example, spatial and temporal conceptualization. It can be "something" in (a certain) space-time domain. The space-time characteristic is already some kind of characteristic.

Taking the above into account, the concept of an event can be understood differently.

If by "event" we mean "something" that happens in space and time, then such an event is still largely an unconceptualized fragment of reality. If by "(actual) event" we mean something definite that happens at a given moment in time (and maybe in a given place in space), then such an event is a full-fledged space-time event that has a space-time identity. This event may be more or less specific. That is, some real object can be given within its framework - a certain and concrete (as rooted in reality) thing. The degree of certainty and, consequently, the conceptualization of the reality fragment (event) may vary. On the contrary, the space-time point in 4-dimensional diversity is not an element of reality but a mathematical element of its representation; it is ideal.

Since "actual event" implies the use of concepts (as rules), we can also talk about a "language game" in the sense of Wittgenstein, rule-driven, rule-driven, phenomenon (as a measurement of reality by a norm) or fact. Thus, we bring together the concepts of "event", "phenomenon", "fact", "language game".

Note that "fact" is often understood as a true sentence describing/representing an event that has already taken place. In this case, "fact" is kind of detached from the real event. The fact turns out to be decontextualized.

On the contrary, "fact", as a real event itself, implies the application of concepts in context and is therefore rooted in reality. In this "fact", the logical failure between the conceptual and the real, between the event and its description, is initially closed.

Thus, we do not distinguish between the linguistic representation of a conceptualized event - "fact" and the "event" itself. Such a distinction would only be necessary if there were absolute "effective events" expressed by facts.

Thus, a certain event does not arise in itself in "external reality", because reality itself has no certainty. An event is identified in context as a result of applying concepts, theory. Such a certain (already identified) event is not predetermined. That is, its actualization is not a choice from the "storage" of predetermined abstract possibilities. Bitbol, for example, claims that an event does not occur in nature regardless of the conditions of its observation and "collective (intersubjective) certification": "What is the actual event, if not the object of consensus, of the numerous subjects capable of *recognizing* it? (Fr. aptes au *constat*)" [Bitbol 2015: 7].

One might ask the general question: "What is there? "Let's first point out the most obvious kind or way of existence. The computer I'm looking at exists at the moment I look at it. I also know that it existed for a while before this moment and will exist for a while after it. Realism about the past and realism about the future are sensible positions. The further from now on my knowledge is less reliable and gradually turns into an opinion.

Existence as a certain reality here and now is an event, or phenomenon within which the object is given (in our case, the computer). This involves the application of the concept, the conceptual "dimension" of reality. Past and future can be measured in the same way.

Actual state of things - what happens here and now, in space and time, is real, if it is correctly identified, if it is not an illusion. That's what it is. What has existed in the past, or will exist in the future if it really existed or will exist, is also real. But these latter types of reality are different in nature from the present and from each other. Reality can have different nature.

Above, we made a distinction between an (non-conceptualized) reality fragment and a conceptualized reality fragment and introduced the concept of "event" in the sense of a conceptualized reality fragment. We interpret what Bitbol calls an "effective event" as an unconceptualized fragment of reality [Bitbol 2015].

The concept of events can be used in theory. For example, speak about events in space and time in the Newtonian mechanics and space-time events - points of space-time - in (special and general) the theory of relativity, and also the quantum

theory of gravity and in general in the theory with space and time. In classical mechanics the material point describes a trajectory consisting of space-time events. But the concept of event may not be in theory. In quantum mechanics at present time the particle as though simultaneously is in different points of space. Therefore, it makes sense to talk about the event "at this point in time and at this point in space" only at the moment of measurement, not in theory. In this sense, there are no events in quantum field theory either. That is, in general, the event belongs to the field of pragmatic-practical, or to the field of reality. Therefore, the presence of space-time in theory is not necessary. They say that some theories of quantum gravity have no space or time. Moreover, even classical theories can be formulated in an untimely manner. Einstein's equations in OTO, Schroedinger's equation and classical mechanics equations can be written in a form that does not contain time as an independent variable [Rovelli 2018A].

The introduction of time and space is inevitable if we apply theory in practice to describe reality, physical phenomena. We observe these or those values of physical quantities at some point in time and in some area of space. Events relating to the inner world of a person also occur at least in time (the space of such an event can be referred to as the place and conditions in which a person is).

General preconditions of metaphysical realism and anti-realism

Traditional realism and anti-realism are radical metaphysical positions. Elements of these positions can be mixed in different proportions, forming intermediate positions. Conceptual analysis makes it possible to bring different positions closer by identifying and eliminating their false assumptions.

Both positions do not distinguish between the categories of ideal, to which the norms refer, and those of real. In other words, both positions ignore the normative dimension of phenomena, the contextuality of ontology, and the subject's engagement.

Anti-realism in its various versions - idealistic, positivist, instrumentalist, pragmatic, phenomenological, linguistic, semantic and others - is a reflexive position. Attention is primarily drawn to the means of measuring reality: language, conceptual schemes, structures of perception or "organization" of experience, and others. As a consequence, the anti-realist does not try, as the realist does, to understand the structure of the world and its laws, but only to describe or predict "phenomena", "facts". For an instrumentalist, physical theory is a prediction tool. Questions about the relationship between theory and reality, about the nature of predicted phenomena, about real things themselves are not raised. In other words, the anti-realist does not take his own attitudes, concepts and theories seriously enough. He's not engaged enough. Since the relationship between language, conceptual schemes, norms/rules and reality is not considered, the former are understood as something external to what is expressed, described and regulated. For example, for a linguistic idealist and constructivist, language and our conceptual schemes define what exists.

Engagement, as well as action - if it is really an action that is only possible in reality, implies a realistic position. And vice versa: true realism can only be active, implies the engagement of the subb ject. It is realism, not idealism, that presupposes the existence of a true ideal (both high ideals and simply ordinary norms). Benoit rhetorically asks: "What would be reality without the ideal?" [Benoist 2018 Préface] In turn, Bitbol writes that the position of the anti-realist has an ethical disadvantage [Bitbol 1994].

Anti-realist and realist may use the same terms: "phenomenon", "fact", "reality", "object", "referent", "truth" and others. But they understand them differently. However, the definitions of these notions cannot be arbitrary. Divergence in

definitions - the consequence of differences in positions, prerequisites of positions.

Take, for example, the concept of a phenomenon. That's the concept Platoist introduced [Benoist 2016]. And he discovered that every phenomenon has a normative structure: a phenomenon implies the difference between appearance and reality (and thus he introduced the notion of being into philosophy). Visibility may or may not match reality. Aristotle has developed this concept. For him, the phenomenon has the following logic: "(...) the appearance is true; not in itself, but for him to whom it appears, and at the time when it appears, and in the way and manner in which it appears" [Aristotle, Metaphysics, Book 4, 1011a]. "("(...) What appears to exist is not [in general], but only for who it is presented to, when, how and under what conditions. [Aristotle, Metaphysics, G (fourth), 6, 1011a23-24.] Within the framework of contextual realism - the position we consider correct - we also interpret the phenomenon as a language game, i.e., measuring the perceived by the norm. The real object is given within the framework of a correct language game, a phenomenon that is not autonomous but is rooted in reality.

Subjective anti-realist means subjective visibility, for example, subjective data of the senses, while objective anti-realist means objective data of measuring instruments (objectivity is understood in the sense of intersubjectivity of observation data). The positivist tries to organize the "observable facts", understood in a superficial sense. For him, the "phenomenon" has no depth.

The phenomenologist sees the phenomenon as something autonomous. It absolutizes visibility as if it could exist by itself and have the greatest credibility. It naturalizes the normality (logical structure) of the phenomenon and transforms it into the "physics" of the phenomenon (see the critique of Jean-Luc Marion's phenomenology in [Benoist 2003] and [Benoist 2016 Logique]). The phenomenology of the 20th century, trying to get rid of the subject's participation in the phenomenon, reaches the opposite result: it turns the phenomenon into pure subjectivity.

The position of the anti-realist contains a fraction of the truth: "the essence of phenomena" is not a certain metaphysical essence. The anti-realist, however, denies that within the framework of the phenomenon the very real thing is given, that the relationship between the aspects of experience identifies the real thing. If he operates with the notion of reality, it has a specific meaning for him.

As mentioned above, the notion of "reality" cannot have any arbitrary meaning. Its meaning is the meaning of a categorical concept: reality is what it is. At the same time, this concept has an infinite number of specific uses. For Wittgenstein, Austin, Queen, Jocelyn Benoist [Benoist 2011], and many others (for example, for the famous theoretical physicist Carlo Rovelli [Rovelli 2018 "Space is blue...", 2018 "Space and time in loop quantum gravity"), the word "real" has many meanings. We understand this not in the sense of multivariate concept of reality, but in the sense of existence of different types (areas, aspects, etc.) of reality, i.e. in the sense of different meanings-use of the word "real". In the same sense, it is possible to understand the following statement of Bohr, although it seems to us ambiguous: "The word 'reality' is also only a word that we must learn to use correctly" [Petersen 1985: 302]. (Cited in [Mamchur 2014].)

Metaphysical realists and anti-realists only focus on certain aspects of the phenomenon, detaching them from each other and the context, ignoring or objectifying the normative dimension of the phenomenon, mixing the ideal (norms, rules, concepts, language) and the actual. As a consequence, the metaphysical realist and platonicist consider the real object to be a meaningful object external to the subject of the world. For the former, it is a material or natural world in the broad sense. For the second one, the world of ideas. Both worlds unambiguously define the language required for its description (representations, expressions).

By objectifying the ideal (concepts, language, norms, rules), the Platonist interprets it as a special kind of reality. In fact, an ideal object (here we use the term "object" in a very broad sense, particularly for concepts), if it is not a pseudo-object, exists only in the context in which it is rooted.[21]

Metaphysical realists, in turn - and this is another side of the same coin - forget that any real object has (definite) meaning only in context (which in some circumstances can be forgotten, but which is always present). The real object is given only within the framework of this or that perspective, point of view, as the realization of an ideal "object" (i.e. norms, rules, concept). There is no ready-made, already meaningful world outside of us, with its laws and organization, regardless of our existence, our means of cognition. In this sense, knowledge is not passive, but active. The metaphysical realist tries to imagine the existence of a meaningful outside world, independent of the intellect, sensual perception[22] and experiment, as if something could make sense, to be meaningful, regardless of thought. He tries to reveal the "essence" of the phenomena, forgetting about the ways of identifying things, separating the real object from the language, concepts or theory that allows to give it certainty (but not constructing it as anti-realist believes). This is how a metaphysical idol emerges - a metaphysical object of the outside world. This also gives rise to the idea that an object or type of embrace may in principle be unaccounted for. In fact, in principle, the unrecognizable object is not an object at all, but a metaphysical fiction. An object that is unobservable or unrecognizable in principle (and not practically) cannot exist. Not in the sense that it makes sense, but for one reason or another it cannot exist, but in the sense that, strictly speaking, it does not make sense.

Let us point out one more kind of "realism", which, strictly speaking, is a kind of idealism. Semantic realism in the sense of Dammets argues that the terms of any sentence have references in the world, and the sentence itself has its own truthful conditions, regardless of whether we can at least in principle establish its truth or falsehood. That is, the truth of the proposal is determined by external factors that may not be available to us. For Dammets, truth is a non-epistemic concept. It doesn't depend on our ability to establish or approve it. The principle of bivalence is (not obligatory) a consequence of the non-episystemic nature of truth [Dammett 1982]. Semantic realism can be considered as a linguistic consequence of metaphysical realism. In fact, under certain conditions, there is an even closer connection between semantic realism - attributing the inner meaning of truth to sentences (or statements), whether or not they may be recognized, and metaphysical realism - asserting that there are real things on the other side of this content. For example, for Bolzano two positions are equivalent to [Bolzano 1837] (see analysis in [Benoist 2019 Absolument vrai]).
Semantic realism comes from pure semantics, does not take into account pragmatism, that is, the rooted semantics in reality. So it is actually idealism.

Semantic anti-realist, on the contrary, claims that sentences have references only when there are empirical procedures for their reidentification, and the sentences (or statements) themselves have certain truth values only when there are empirical procedures for their verification. The principle of bivalence is thus violated. According to Bitbol, for the anti-realist reference points are "stability poles" in the flow of phenomena, or invariant structures that allow to organize phenomena [Bitbol 1994].

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[21] For us, strictly speaking, there are only real objects. "Perfect Objects" - concepts, norms, rules. They are not identified as objects, but are used to identify objects.

[22] Let me remind you that we take the position that there is no distancing between the primary perception, "perceived" and reality [Benoist 2013].

The form of anti-realism is semantic idealism, which sees meaning as existing in itself. The position of Jocelyn Benoit, which we share, is briefly as follows. Reality and meaning belong to different categories. The meaning in itself is perfect. At the same time, the real meaning has real conditions of its existence (only in this sense can it be called "real"). So there is no point in talking about meaningless reality or about the impact of reality on our semantic constructions and opinions. The "problem of access" to reality is also a pseudo-problem. We are part of reality, we are in contact with it from the beginning. The real problem is to give reality meaning within a perspective (context). A hopeless look "out of nowhere" makes no sense. At the same time, the perspective does not obscure access to the thing itself, as traditional perspective believes, but on the contrary, it is supposed to. Language and meaning are not a kind of veil between the subject and reality, but, on the contrary, they allow us (correctly or wrongly) to "measure" reality, give us access to the very things. Any view of reality is promising. In other words, Benoit rejects the ideas of an absolute (non-scale) view of reality, the finitenesses of our cognition, and the correlationism prevalent in continental philosophy. (For details, see [Benoist 2016 Realism and Metaphysics].)

Normative pragmatism instead of traditional realism and representationalism

Quantum mechanical paradoxes arise as a result of attempts to find the answer to a question that actually represents the objective quantum reality existing irrespective of quantum mechanics and described (represented) by it. That is, paradoxes arise within the framework of the traditional epistemological paradigm that operates with the notion of representation as an intermediary between the subject and reality and the metaphysical notion of reality as fixed predetermined entities (objects, entities): objects, properties, relationships, and so on.

Pragmatic interpretation rejects metaphysical realism and representationalism (and with them the epistemological "problem of access" to reality [Benoist 2011]) of classical epistemology. Instead of constructive metaphysical solutions, the way of reflexion and analysis is suggested.

A detailed study of the pragmatic and practical procedures that underlie quantum mechanics was proposed in [Bächtold 2009] (for the idea of pragmatic interpretation of quantum mechanics, see also [Pris 2008]). For Bitball, a pragmatic "proto-interpretation" avoids conceptual problems. Quantum mechanics should be understood as "the practice of orientation and choice of perspective in a given environment". [Bitbol 2015: 8].

Thus, at first glance, there is an obvious "failure" between quantum theory and classical theories, which also offer a deterministic picture of the physical world. Quantum probabilities differ from classical probabilities in that the latter are assumed to be epistemic (it is often difficult and sometimes impossible to acquire precise knowledge. However, it is assumed that such knowledge is possible in principle).

In fact, with the right view of physical theory, physical practice and the concept of reality, the seeming fundamental difference between classical theory and quantum theory disappears. Moreover, it is quantum theory that allows to reveal the correct (deeper) view of physical reality. As for the law of probability, like physical laws in general, it should be seen as a separate rule for measuring reality.[23]

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[23] Our viewpoint has certain similarities with Cubism (a kind of quantum Bayesianism). The latter also claims that the Bourne rule is a normative statement, and theory is a tool that a subject can use to work with his expectations,

Many physicists suggest that metaphysical realism should be abandoned. For example, Smerlak and Rovelli suggest abandoning Einstein's "realism" within the framework of a "relational" interpretation of quantum mechanics. It is argued that only space-time events "here and now", not the wave function, have ontological status. It is[24] argued that it is possible to satisfy the conditions of completeness, localization[25], and separability [Smerlak 2007]. (See also [Rovelli 2015], [Martin-Dussaud 2018].)

As for the concept of locality, it is known that in 1964 Bell showed that quantum correlations arising from the entanglement of quantum states of physical systems can not be understood within the framework of a theory with hidden local parameters [Bell 1964]. This means that realism and locale of predefined (properties) quantum objects are incompatible.

Bitbol points out that in the 1981 article Bell gets even more surprising result: quantum mechanics excludes compatibility of reality of experimental events (note that we are talking about reality in the metaphysical sense) and their localization [Bell 1981], [Bitbol 2015].

This is consistent with our contextual approach. As stated in the previous section, a quantum event, as well as a quantum object endowed with certain properties, is not predetermined (only metaphysical realism treats them as predetermined), but arises in context.

The realism (i.e. metaphysical realism) of experimental events is also rejected by Bitbol, despite the fact that this allegedly contradicts the minimal (empirical) realism (which, strictly speaking, is already anti-realism. To reject also the

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a guide to decision-making that has been shaped by some aspects of physical reality. Cubism, however, is an anti-realistic and even subjectivist approach [Fuchs 2017].

[24] Christopher Fuchs - one of the founders of Cubism - compares the realistic (ontological) interpretation of the wave function with the concept of the ether, from which, as we know, Einstein's special theory of relativity has successfully got rid.

Giovanni Mion compares Einstein's and Wittgenstein's approaches. The first gets rid of the concept of ether, which is present in Lorenz's approach, by transforming the empirical position on the constancy of the speed of light into a postulate, that is, into a normative position. The second gets rid of the problem of skepticism and disadvantages of its empirical solution by Moore by transforming the empirical sentences of the kind "This hand", "Earth existed five minutes ago" into normative sentences - "axial sentences" [Mion 2019]. (See also our more detailed analysis [Prissy 2017].) We apply a similar approach in the philosophy of quantum mechanics.

[25] The article [Martin-Dussaud 2018] singles out five notions of locale that are not equivalent at all, although closely related: 1) signals cannot spread faster than the speed of light; 2) the spatial distance of causes and effects from each other is limited by the speed of light; 3) quantum systems, separated by a space-like interval, do not affect each other; 4) interaction is possible only point - at the same point of space-time; 5) local variables relating to areas of space separated by space-like interval, commute. Our interpretation of quantum mechanics within the framework of contextual realism is compatible with all these notions of locality.

empirical reality of events at first sight is radical anti-realism) [Bitbol 2015] (see also his article [Bitbol 1983], in which he rejects the internal reality of experimental events).

Bitbol also shows that William James' radical empiricism and radical scientific realism of theoretical objects, although they get rid of the notion of real experimental event, are unsatisfactory approaches to understanding quantum mechanics [Bitbol 2015].[26]

In short, the first approach states that there is only direct experience at a given moment in time (hence, there is no predetermined event). Past quantum events do not have any reality in themselves, but only depend on the procedures of their construction in relation to the actual experience, are conceived post facto. In other words, we are talking about interjective agreement in the present time. For example, "quantum correlation" is seen as post facto reconstruction rather than as a real correlation between events.

Radical scientific realism in quantum mechanics most often takes for reality a wave function that evolves continuously and deterministically according to the Schroedinger equation. That is, the wave function is considered as describing the real state of the quantum system. From this perspective, there are no events. The approach, however, faces the problem of linking formalism to specific experimentally observed events.

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[26] American pragmatists - Pierce, James and Divya, and especially James - are referred to by Fuchs when analyzing the notion of a quantum phenomenon and, in particular, the notion of Bohr's phenomenon, as part of his Cubism [Fuchs 2018]. We argue that Cubism contains essential elements of anti-realism that can be addressed within the context.

From metaphysical solutions of the measurement problem to its "deflacionist" elimination

If we measure the physical quantity of X and get a certain value of it, a, we know that the system is in its own state F of operator X, so that XF = AF. Suppose we then measure the physical quantity of Y and get its value, b. Now we know that the system is in its own state F' of operator Y: "F' = βF'. The following question arises: How did the transition from one state to another happen, that is, the transition from F to F'? As a result of this transition, the dispositions of the quantum system and its potentiality have changed. Formally, this change is described by a reduction of the wave function, which is not subject to the Schroedinger equation. The problem is how to understand this reduction.

The classic notion of a mutual correspondence between reality and the theory that "reflects" it can be called an "outside point of view". Classic mechanics creates the illusion that such a point of view is possible. This theory is as if it really fully reflects the reality of moving material bodies, such as the reality of moving planets of the solar system.

There are "holistic" interpretations and quantum mechanics that accept the point of view "from outside". These include, for example, the interpretation of Bohm, in which micro-particles move along trajectories in the field of the guiding wave and have hidden values of speed and position (in this case we distract from the original ontological motivation of Bohm's interpretation) and the metaphysical interpretation of Everett, understood in terms of the plurality of worlds or consciousnesses, which we have already discussed in previous sections [Everett 1957].

According to the multi-world interpretation of quantum mechanics, all possible implementations of the act of measurement are indeed realized in "parallel" worlds on which our world is splitting at the moment of measurement, or in "parallel" consciousnesses on which the consciousness of the observer is split at the moment of measurement.

In terms of multiplicity of consciousness (mental pluralism), Everett's interpretation is David Albert [Albert 1983, 1987]. His approach shares with other metaphysical approaches the traditional theory of knowledge, which, as we said in the previous section, is problematic [Bitbol 2000a, 2015]. In fact, Everett's original interpretation, as stated in the previous sections, is not metaphysical, and

its metaphysical interpretations allow for demystification within the framework of Wittgenstein pragmatism and realism [Prissy 2016].

Niels Bohr solves the problem of measurement by epistemological (but not ontological) division of reality into two parts: one part of reality is described by quantum mechanics, and the other - related to the measuring instrument (observer) - is described by classical physics, using classical concepts. However, the boundary between them depends on the context. Such conceptual dualism contradicts the universality of quantum mechanics (even if Bohr believed that all reality is quantum in ontological terms).

Von Neumann tried to give quantum mechanics a universal character. He developed his quantum mechanics formalism for a closed system observed from the outside. Classical concepts do not apply, but the dualism of subject (observer) and object (quantum system) is preserved, although the line of division between them is conditional [Neumann 1964].

One can try to eliminate this dualism by including the interaction of a quantum system with a device considered as a quantum system. This does not, however, lead to a specific value of the physical quantity to be measured. To get its specific value you need to enter a second order observer. And so on. There's an endless regression.

Attempts to eliminate the endless regression of the von Neumann approach by introducing the notion of self-monitoring have also failed [Bitbol 2015].

Attempts were also made to eliminate subject and object dualism by drawing a dividing line between a quantum system with a small finite number of degrees of freedom and a medium with a very large, almost infinite number of degrees of freedom (the observer refers to the medium). As an environment, you can take the entire universe surrounding this quantum system. Such a quantum system, however, will not be closed. (Only the universe as a whole will be closed.) An open system requires a generalization of von Neumann's quantum formalism. Such formalisms exist. They describe open finite systems that interact with the endless environment around them. In this case, the quantum system and the environment are homogeneous, have the same physical nature. This means that the traditional dualism of object and subject is eliminated [Primas 1990]. Nevertheless, the need to consider the universe as a whole (global Honism) is not a satisfactory feature of the approach.

The successful application of quantum mechanics and, at the same time, the impossibility of satisfactorily solving the "measurement problem" by treating measurement as a physical or mental process, suggest that this problem has to do with philosophical logic and can be solved "deflatsionistically" with the help of therapeutic conceptual analysis, the application of which is inextricably linked to the understanding of pragmatic and practical prerequisites.

From the logical point of view, theory cannot be put in a mutually exclusive correspondence with reality. It cannot literally "reflect" reality, because reality and theory belong to different categories. This means that the notion of a reciprocal correspondence between theory and reality that implies an "outside view" or "God's view" (Hillary Putnam's expression) is wrong.

We interpret the physical theory and, in particular, the quantum theory, as a Wittgenstein rule (hereinafter: c-rule) [Prissy 2014, 2018].[27] Quantum theory as in the rule of law is "universal." That is, like any rule, it has its own area of applicability (meaning) and is universal in it. But this area is established during the application process. And it doesn't imply a division between the observer and the observed. Quantum mechanics gives a slice of reality. Its effective application, i.e. actualization of the rule, pragmatic and practical. The peculiarity of quantum mechanics is that as a result of actualization, the physical value appears to be corresponding to only one summand in the decomposition of the wave function on the basis of the eigenfunctions of the operator of the physical value, not the wave function as a whole. But that is the connection between the mathematical apparatus of quantum mechanics and its physical interpretation.

The perspective (contextual) view of the measurement result does not lead to the question of other possible measurement results and comparison between them. Implementation (actualization) of observation is irreversible. It automatically excludes other implementations (their existence in parallel worlds). Comparison of different measurement results is made from an external point of view, as a result of theoretical reconstruction.

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[27] A similar interpretation is given in [Bitbol 2015]. Bitbol writes that quantum theory gives "rules for action, but not the slightest indication of what the action refers to" [Bitbol 2015: 387].

Unlike classical theory, in quantum theory the concept of an event is by no means formalized. The event, according to the Beatball, is a performative event. In our terms, it refers to the application of a rule. That is, an event is an "event" of rule application. Therefore, the event is not predetermined. The rule does not apply to it from the outside, but identifies it in context, within the language game.

Philosophy of physics often makes a mistake, which, in our opinion, Wittgenstein points out: representation (conceptual) is mixed with reality (real); one takes first for second. In particular, the objective event in classical mechanics is the representation of an event, not a real event. In classical mechanics, unlike quantum mechanics, this mixing, however, has no serious consequences.

Measurement problem as pseudo problem (logical problem)

As we can already conclude from the above, the measurement problem in quantum mechanics is a pseudo-problem, which owes its existence to the mixing of real and ideal categories. Let's take a closer look at this issue.

We agree with Joslyn Benoist that metaphysics mixes the categories real and ideal [Benoist 2017, 2018B]. Metaphysical realism, the epistemology of modernity, continental idealism (anti-realism), in particular postmodernism, and the semantic idealism of analytical philosophy, the traditional phenomenology that considers the "phenomenon" as an autonomous given, as well as the residual idealisms of the so-called "new realisms" of the 21st century - the consequences of such a mixture. Contextual realism - a truly realistic (critical) approach - takes this distinction into account

We argue that the so-called measurement problem in the philosophy of quantum mechanics (which will soon be almost 100 years old) can also be solved by taking into account the categorical difference between real and ideal, in particular between a quantum system and a measuring instrument.

The starting point is to notice that by definition quantum measurement with a macroscopic device is not a process of its interaction with a microscopic quantum system. Therefore, the stochastic and irreversible reduction of its wave function has no status of a physical process.

Let's start with a few historical references showing that conceptual analysis and the difference between logical and real to some extent, explicitly or implicitly, have been taken into account before, both philosophers and physicists.

According to Niels Bohr, the concept of cause is not applicable to the relationship between an atomic object and a measuring instrument. That is, it is impossible to say that interaction between the device and atomic quantum system is the reason for what is observed on the screen of the device, as only the causal relation between macroscopic phenomena can be detected experimentally [Faye 1991].

By criticizing Kant, Schopenhauer writes:

"Let's pass to other significant (grande) statement of realism, namely that the reason of our sensual perception are "external" objects. It suffers from the same shortcomings as the previous ones. Numerous post-Cantian philosophers have already stressed that applying the Kantian causality category to the relationship between the thing *within* itself and our experience is totally inappropriate, since this category is by definition applicable only *within* experience. The principle of reproduction, which is the rule of using the category of causality, establishes only an objective relationship *between* phenomena, not between these phenomena and something on the other side of them" [Schopenhauer 1966: 37].

Yum believes that the realist projects immanent (semantic and epistemic) traits into the transcendence of the "outside world" and reifies them.

As a result of such projection, the regulatory procedure of attestation turns into an idea of truth as conformity, intersubjective consent into a single structure of the outside world, causality into an intermediary between the world and the senses ([Faye 1991: 207], [Bitbol 1994]). Bitbol writes that it is also possible to consider "fuzzy objects" or "incomplete objects" as projections of epistemic insolubility.

Some new "ontologies" are actually projections of theoretical structures. For example, the interpretation of the wave function of the quantum system within the framework of metaphysical realism (and classical logic) as literally reflecting the structure of the world, leads to a metaphysical picture of the existence of numerous parallel universes. Substantialization of intentionality (norm) leads to a false idea of the existence (in the sense of the field) of a red cap or unicorn. For Marcus, everything exists except the world [Gabriel 2015].

With this in mind, one should distinguish between contextual realism, which identifies what exists by means of theoretical structures in contexts in which structures turn out to be internal points of view, and projectivism, which projects theoretical structures into the "outer world", imposes their realities.

Contextual realism rejects the dogmatic claim that the "outside world" exists. Markus Gabriel makes an even stronger statement: he claims that "the world does not exist" [Gabriel 2015]. As Benoit points out, this denial should be understood as categorical denial: reality, "peace" is categorical. One can talk about the existence of real things in the world, but there is no point in talking about the existence of reality, "the world" as such.

However, it seems to us that the concept of peace can be introduced as a concept of "life forms" rather than the totality of all that exists (such totality really makes no sense). And, therefore, we can talk about different worlds, about the formation of worlds and their destruction (for example, the so-called "globalization" is

nothing but the destruction of our world (or our worlds), so we can ask ourselves whether our world actually exists nowadays).[28]

The point of view on the measurement process in quantum mechanics as a process of interaction between the instrument and the physical system is a kind of projectivism. This view places normative (the rules according to which a measurement is made, and therefore a measuring instrument as a measuring instrument) and real (quantum system) in the same category. This leads to an endless regression: more and more new observers have to be introduced to observe the previous observers.

Regress stops if the above categorical difference is taken into account. In fact, the subject who uses the instrument does not impose his point of view from the outside (an outside view would mean that we classify the measuring instrument and the system above which the measurement is made into the same category), but is already in the context of the measurement, the point of view of the measuring instrument.

Thus, the reduction of the wave function is not a physical process. In particular, as mentioned above, although specific correlated values within a quantum correlation are not predetermined, they are predetermined in a fixed context. Measurement of quantum correlation assumes a choice of this or that context which, according to the laws of quantum mechanics, probabilistic. The choice of context, however, i.e. application in the context of quantum theory as a Wittgenstein rule (norm) for measuring quantum phenomena (and such application can only be in the context of (the phenomenon in question)), by definition is not something that is described or can be described by the theory. The failure between theory and its application in context is logical, not substantive. It closes as part of the language game of applying the theory of Wittgenstein rule.

The problem of measurement in philosophy of quantum mechanics is a pseudo-problem, caused by false preconditions of epistemology and metaphysics of modern style. Although our result is negative - the problem does not exist - understanding why it does not exist allows us to see the error of most interpretations of quantum mechanics. Philosophy is not just conceptual analysis. There is progress and understanding of the truth. But, paraphrasing the contemporary German philosopher Marcus Gabriel, this progress is not in deepening, but in clarifying, bringing to the surface what was hidden behind the metaphysical speculative pseudo-theoreticization.

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[28] Unlike Gabriel, Benoit does not reject the notion of peace.

Let us illustrate the quantum measurement problem with the following example of Wittgenstein, who plays an important role in his subsequent philosophy (see also the analysis of this example in [Benoist 2018]).

Wittgenstein poses the following question: "Isn't that like saying: Before recognizing something as 2 m long by measuring it, do we have to recognize something as 1 m long by intuition? " (Isn't this the case: before we admit that something is 2 meters long by measuring it, we must admit that something is 1 meter long by intuition?). [Wittgenstein 1993: 373]. And Wittgenstein gives him a negative answer.

A standard length, such as a meter, plays the role of the norm. By definition, the standard is used for length measurement. This is accompanied by "intuition." But this does not mean that the standard itself is learned by intuition or applied, compared to the object to which it applies by intuition.

How do we know that we're dealing with a standard (norm)? We are always, initially, in a certain context. The concept of context presupposes the notion of a norm that is implicit (implied) or explicit in it. That is, the standard is already initially implied in a context where it makes sense to talk about measurement. If it's not, there's no point in talking about the measurement. The above refers to the logic of measurement and normativity.

Measuring (one type or another) implies having a norm. And vice versa: the presence of a norm implies a set of its well-established applications.

We can, of course, measure the meter standard itself, for example, if we want to make sure that it is really 1 meter long. We can do this with a different standard meter (maybe more accurate). But in this case, the original standard will no longer be the standard, will change its status. And we still go back to the original question of the length of the standard itself. The circle closes.

Thus, if we always ask ourselves how we know that we really apply the standard, that we really have the standard of 1 meter, an endless regression will occur. Regress stops only if we admit that when a certain length segment plays the role of a standard, it cannot be said that we know that it is 1 meter long in the same sense in which we say that we know that the segment measured with it is this or that length, say 2 meters or 1 meter. "Knowing" that something plays the role of

length standard - logical knowledge, knowledge of "logical fact". It is also possession of this standard, knowledge of the norm, knowledge of how to apply the norm/regulation, i.e. knowledge-like. The knowledge that something is 2 meters or 1 meter long because it was correctly measured as being 2 meters or 1 meter long is actual (empirical) knowledge in its own sense, that is knowledge-what. The first is logically reliable, "axial" knowledge. This is what is supposed to be revealed in context as a norm, usually a concept. The second is the result of applying a norm, rule, concept. Its authenticity is the authenticity of the correct language game. Knowledge-what and knowledge-what do not exist without each other, but are two aspects of the same knowledge.

In other words, an endless regression occurs if we want to be sure, so to speak, that what we measure is really 1 meter long. The problem here is that we do not distinguish between the category of real, to which what is measured, and the category of ideal, to which what is measured. Although the measuring device itself is material, as a result of the measurement it achieves an ideal status as a measuring device. (That is, the question of reality and ideality must be distinguished from that of materiality and immateriality). The measurement norm itself cannot be measured because it is designed for measurement.

To have a norm implies some sense that there is a standard of measurement. This feeling is, so to speak, the "call of reality", overcoming any phenomenon in which it manifests itself. The meaning of the length standard as the length standard in its use. The fact that some wooden bar is a standard length, we are told not by Russell's "intuition". Namely there is no some metaphysical standard of length which is located in Plato's space, and no metaphysical intuition that what has length of one meter has length of one meter. For the metaphysicist "it would be by intuition, as it was, that we should know, not that this or that piece of wood is one meter long but that in general that which is one meter long is one meter long" [Benoist 2018: 159]. "Feelings" of the logical validity of the standard and the epistemic validity of the language game replace the need to introduce "intuition" (see below). Without this "sense" of authenticity, measurement would not have been possible.

Physics as an exact science (criticism of empiricism)

By analogy with the critique of "intuitive" knowledge about the length measurement standard, Wittgenstein criticizes Russell's position that "intuition" plays a role in applying words to real objects [Wittgenstein 1993]. Bertrand Russell, opposing empiricism, believes that the use of words implies, in addition to these senses, "visibility", a non-empirical intuition to distinguish, for example, between a hallucination of an object and a real object to which the word refers [Russell 1935-6]. Thus, in Russell's case, platonism acts as an auxiliary tool that empiricism requires. In other words, Platonism turns out to be the reverse side of empiricism. And this indicates that there are initially false prerequisites in empiricism.

For Wittgenstein, words play the role of norms (concepts) that measure real objects directly in use, without the mediation of intuition. We use words and expressions, language in language games - actions - and forms of life, the presence of which already suggests the simplest paradigmatic (instinctive) cases of their application, in which words refer to real objects. The word does not exist without action (deed), i.e. the totality of its applications. Conversely: any genuine action presupposes a logo (norm) to which it will submit and which can be expressed in words. So "in the beginning there was a word" means "in the beginning there was an action" (Goethe refers to this expression by Wittgenstein). We agree with Benoist that on a deeper level, there is an identity between word and action [Benoist 2018: 161].

It is in action, within the framework of what we are doing, and not through non-empirical intuition (or empirical association, or memory, or otherwise) that words refer to real objects. Language is a system of norms. In his real usage he "measures" reality, the things themselves, identifies in the context of real objects.

So, the basis of our knowledge is not primitive intellectual forms of knowledge-what, but primitive forms of behavior, that is, forms of knowledge-like. In this case, even primitive forms of behavior are normal, that is, the real language games.

The above mentioned knowledge applies to science, scientific language and physical theories. They say, for example, that in physics any statements, predictions, measurements are probabilistic, not accurate. Physics, supposedly, does not give absolute knowledge, because it is an empirical science, and you can not make an infinite number of experiments, you can not exclude that the future experiment will not refute the physical theory. For Karl Popper, any scientific physical theory is falsifiable, can be disproved by future experience. At the same time, falsifiers of scientific theory do not notice that the same argument is applicable to everyday life. But in everyday life, we know a lot.

In fact, in any context, in any established field of physics - the "life form" - and in any language game within the life form, there are limits to acceptable accuracy. If these limits are met, we have not just an opinion justified with some probability, but knowledge. That is, the criterion of knowledge, the rational grounds that are required for knowledge and the obviousness that is required for knowledge depend on the context.

Knowledge is a true informed opinion if the lack of knowledge means that there is no full justification (the so-called cases of Gétier "true informed opinions that are not knowledge" can be considered as cases where there is no full justification). Justification and probability are concepts that do not go hand in hand. In one case, an opinion may be knowledgeable, i.e. reasonable, and in another case it may not be, even if the probability that the opinion is true is less than in the second case (see, for example, [Williamson 2014]). On the other hand, we can talk about more or less reliable knowledge. In other words, there are criteria not only for knowledge, but also for more or less reliable knowledge.

On the contrary, if the limits of accuracy are not reached, one cannot talk about knowledge. In this case, we should talk about the probability that the opinion is true. For example, we are talking about the discovery of the Higgs boson, that is, we know that it exists, and not just have a reasonable certainty that it exists because the statistical precision of the experiment in which it was found was 5 sigma or more. This is exactly the accuracy that is considered in the physics of elementary particles as discovery. When the accuracy was less than 5 sigma, all they talked about was the likelihood that the Higgs boson existed, the hypothesis, but not the knowledge that it existed. An informed opinion, even if it is true, is not always knowledge.

Quantum causality

From Wittgenstein's point of view, it is possible to speak about causes and effects only if, in some basic situations (language games), our most primitive interactions with the environment, we already interpret some things around us as "causes" of what happens, and not only what accompanies what happens, are able to identify some causes and effects, that is, we are able to master the corresponding concepts. In other words, our language, which uses the concept of cause, arises from primitive, "instinctive" causal reactions. These latter are genuine language games that have a normative dimension and already include causal meaning. It is not possible to reduce a causal language to an unjustifiable reason. We cannot identify the reasons if our starting point is such that it is not clear to us at all whether or not they exist and what they are. The primitive language games are authentic. In this sense, they are the basis for our language and its use.

In fact, what has been said above expresses the very nature, the logic of the language, not some of its positive properties.

In other words, causes, effects and cause-and-effect processes do not exist in the "outside world" per se. At the paraphrase level of abnormal reactions, there are no specific causes or consequences. An instinctive response becomes a causal relation where we are able to use the concepts of cause and effect. From the point of view of the language logic, "causes" are not objects; they are not given.

For Wittgenstein, the concepts of cause and effect are defined within the framework of their actual use, i.e. within the framework of a corresponding language game involving "causal experiences". The latter, therefore, only make sense within the framework of the causal language game: they accompany it. So Benoit writes that the status of "causal experimentation" is analytical. "It is all right to call them 'experiences of the cause', but this is analytic: they are such because the language game of cause and effect is built on such experiences." (They can be called "causal experiences." But this statement is analytical: they are, because the language game of cause and effect is based on such experiments) [Benoist 2018].
Jocelyn Benoit writes:

"The fact that my hand does not hurt anymore when I remove it from the flame does not mean by itself that this flame is the 'cause' of my pain. We are back to the main point: it seems that 'the cause', as such, is not given. To call it a cause is always already to exceed the limits of the

given: to place it in a logical space. However, when we 'look out for a reason', we already do that: we look out for something that is not a mere concomitant but that we want to be able to take for the real reason of what we wish to change or to control. If it is not possible to take it this way, I. e. to take that it is truly the cause, there is no 'cause'. 'Cause', essentially, is 'the true cause'. Now, this possibility essentially presupposes language and this capacity that it saddles us with to take some distance from the given." (The fact that my hand no longer hurts when I take it out of the flames does not in itself mean that the flame is the "cause" of my pain. We return to the main point: it seems that the "reason" as such is not given. To name a flame as a reason is to overcome the limits of the given: to place it in a logical space. However, when we "look" for a reason, we already do: we look for something that is not just accompanying, but that we want to accept as the real reason for what we want to change or control. If something cannot be considered in this way, that is to say, if it is the true cause, then there is no "cause". "Cause" is basically "true cause." This capability essentially presupposes the language and, with it, the ability that allows us to be at some distance from the given one.)» [Benoist 2018: 162-163]

Wittgenstein's "primitivism" is that the language game is based on something "instinctual". "In its most primitive form it is a reaction to somebody's cries and gestures, a reaction of sympathy or something of the sort. We comfort him, try to help him" (in the most primitive form this is a reaction to someone crying or gestures, a reaction of sympathy or something like that. We comfort him, we try to help him.) [Wittgenstein 1993: 381]. These are basic human reactions. They're standard. We are able to reason in causal terms because we have this kind of normative experience.

So, before we talk meaningfully about causes and effects, before we doubt whether some things we consider to be the cause, in some established cases we must be sure that some things are the cause of some events. In other words, (certain) causes exist only within the framework of the causal life form, i.e. within the life form in which the (one or another) concept of cause has been developed. Like other language games, causal language games are established thanks to success. Reliability and success are primary, doubt is secondary.

Since the concept of cause becomes meaningful only within the framework of the language game, and in different areas of reality language games are different, the concept of cause is not unambiguous. For example, it is impossible to argue about the cause of quantum correlation, based on the concept of causality, used in everyday life or classical mechanics. Quantum causal language game should include the use of quantum theory.

Traditionally, to explain something is to find its cause. The cause of the phenomenon in a generalized sense can be understood as its logic - a rule that allows reconstructing the phenomenon, justifying it post facto. It seems to us that such a reason (rule) can also be seen as the best explanation for the phenomenon.

As is known, the "best explanation principle" asserts that the best explanation should be chosen from all possible ones. However, an explanation that is not supposed to be true cannot be considered the best one.

This means that the principle implies a position of realism. The supposed realism, however, is metaphysical. It is assumed that there is already a predetermined reality that the explanation is true or false. The best explanation is true, explains it correctly.

This understanding of the principle leads to the problem of its justification. We can never be sure that the "best" explanation is really the best. "External reality" can always be different than we assume. The choice of the best explanation is guessing. And you can never be sure that we got it right. It seems to us that we are talking about the instantiation of the epistemological "problem of access" to the external reality, which the philosophy of modernity faces.

In fact, the "best explanation" can be interpreted differently: not as an explanation of a predetermined metaphysical reality, but as an explication of a rule, a "grammar" (not predetermined) nonmetaphysical reality within a language game or context [Pris 2008].

The correct application of this rule is the "best explanation" of the corresponding phenomenon, since within the framework of the phenomenon it identifies the real object. The failure between the two is logical and closes in practice.

That is, something is real not because it is postulated to be the best explanation, but rather because it is based on reality and therefore identifies the real object. Reality is primary, the explanation is secondary, not the other way around.

Thus, revealing general grammar rules and detailing (substantial) conceptual scheme of the phenomenon - description (or "representation") of the phenomenon - is at the same time revealing its cause in a generalized sense. The notions of explanation and description converge to the same concept.

That is why it seems to us that Bitbol calls the confusing wave function [Bitbol 2015] as the cause (in a generalized sense) of the quantum correlation. That is, it is this quantum language that allows you to talk about the reason. Where there is no confusion of the wave functions of the two systems, there is no correlation.

The quantum correlation is explained by the evolution of the wave function subject to the Schroedinger equation,

Quantum causality, in contrast to classical causality, is "not autonomous and categorical, but conditional and participatory" [Bitbol 2015: 336]. That is, the existence of causality presupposes the existence of a subject applying theory, concepts - a subject participating in practice. In fact, as we mentioned above, it is so even in the most ordinary cases.

Quantum correlations

The quantum correlation is that when we measure the value of the particle being observed for one particle, we know that another particle tangled with it, located as far away from it as possible, will have a certain value of the observed, even though no particle had a certain value of the observed before the measurement.

The notion of the collapse of the wave function assumes metaphysical realism and leads to an unacceptable notion of range in the case of quantum correlation (another name for quantum correlation: EPR (Einstein-Podolsky-Rosen) experiment [Einstein 1935]). At least, the case looks as if there was a long-range action, as if the collapse of the wave function of one particle instantly influenced the collapse of the wave function of another particle.

Both Einstein and Schrödinger [Schrödinger 1935, 1936] opposed the notion of a reduction of the wave function as a substantial "collapse. As part of Everett's interpretation, which tries to pave the middle ground between the positions of Bohr and Einstein, there is no collapse [Everett 1957][29]. To refuse in quantum mechanics from concepts of collapse of a wave function and quantum system, and also from metaphysics of particles and actions on distance, to redefine concept of entanglement suggest, for example, de Rond with co-authors [de Ronde 2018 B].

The contextual point of view we offer is as follows in brief. The measurement simply identifies in a sort of fragmented reality a certain context in which both particles have certain (correlated with each other) values observed (e.g. two electrons may have a projection of a spin on the z-axis one second, or one electron may have a projection of a spin on the z-axis one second and the other minus one second). Different measurement results refer to different contexts. The transition from one context to another is not some kind of substantive context transformation. The concept of "context" here means that the interaction between the observer and the system being observed, which is better called "contact", is not perturbing. Otherwise, we would not be talking about measuring the system, but about measuring the interaction of the two systems. Such interactivityism would be a form of correlationism claiming that we only have access to the correlations of the observer and the observable, and not to the observer and the observable as such.

Let us consider the proposed point of view in more detail.

Observation of quantum correlation between physical quantities assumes preliminary preparation of a situation of confusions of wave functions, and also use of quantum language (it is a pragmatic moment) and practice of application of quantum theory. In fact, these conditions are necessary for the very existence of a certain quantum correlation. By itself, that is, irrespective of the use of the theory and before it, that is, before the moment of identification of the correlation in the quantum language, the correlation does not exist as a certain object in the "outer world", that is, it is not predetermined.

In a general case, from the point of view of contextual realism, we assert, in quantum mechanics, it is senseless to speak about certain events (that is about events as such) before their identification by means of quantum theory.

From the point of view of everyday life, it is considered that first an event occurs and then it is formulated as a fact with the help of language. This "event" seems to be absolutized, out of context. In fact, an event exists as a certain given and is only identified within the framework of a "language game" - we use Wittgenstein terminology - the use of language, such as physical theory.

Okay, let's turn to the quantum correlation. It is known that the results of simultaneous (or not simultaneous) measurements of some physical quantity of two tangled systems, as many removed from each other in space, correlate (for example, measurements always give the same (or opposite) values of the projection of the back on the z axis).

If to assume that it is a question (as it is supposed within the limits of classical physics) about correlation between two events arising in "external world" then for the explanation the correlation demands either to recognize long-range, i.e. existence of the interaction transferred with speed exceeding speed of light and even instantaneously (whereas it is easy to show that the correlation does not allow to transfer the information faster than speed of light), or to recognize existence of the general material reason of two correlating events acting according to

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[29] Note that Everett quotes Einstein as saying that he does not believe that a mouse could bring about drastic changes in the universe simply by looking at it" [Everett 1957 Dissertation: 116]. Schrodinger writes, "But jokes apart, I shall not waste the time by tritely ridiculing the attitude that the state vector (or wave function) undergoes an abrupt change, when 'I' choose to inspect a registering tape." (Except for jokes, I won't waste time mocking the view that the wave vector (or wave function) suddenly changes when the "I" decides to inspect the registration tape).

Action is rejected by most physicists. As to causal correlation by analogy with classical correlation, its existence is equivalent to existence in quantum mechanics of the latent parameters.

In 1964, Bell showed that quantum correlations as a result of the confusion of quantum states can not be understood within the framework of a theory with hidden local parameters. This meant that realism was not compatible with local predefined properties of quantum objects. They say that in quantum mechanics "local realism" is broken. In 1981, Bell also states that quantum mechanics excludes the compatibility of the reality of experimental events (to be understood: understood as a predetermined reality) and their localities. "Realism", i.e. the internal reality of experimental events, is rejected by Bitbol [Bitbol 2015] (see also his article [Bitbol 1983]).

At first glance, it looks like radical anti-realism, since even minimal (empirical) realism is rejected. But from our contextual point of view, a quantum event (as well as a quantum object endowed with certain properties) is real but not predetermined (only metaphysical realism interprets them as predetermined, meaningful in itself).[30] Within contextual realism, ontology is contextual. This also applies to the ontology of events.

By interpreting the quantum correlation, we can argue this way. In fact, as a result of confusing the two systems (their wave functions - for example, spin functions (spins)), a single system emerges. Therefore, it is impossible to speak about two independent subsystems (components of the common wave function, two independent physical variables). This means that a measurement made over one "subsystem" is at the same time a measurement made over the whole system and therefore also over the second "subsystem". By definition, by the very meaning of the confused wave function, the result of the measurement made over one "subsystem" defines the result which at the same time or later can be made over another subsystem. There are no two "events" here, but one measurement event made over the whole system. Therefore, strictly speaking, the language of correlation is inappropriate. Or we should not talk about the correlation between two events (as if they were events in the "outer world"), but about the correlation between the two measurement results.

It is not possible to tell that such explanation recognizes non-locality in sense of range, as the question is about the integral system, instead of two systems having

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[30] The classic metaphysical (acontextual) approach to the event is contained in the Wittgenstein *Tractatus*: sentence - image (picture) of reality (§ 4.01). The proposals *show a* logical form of reality (§ 4.121). In the case of an event, this means that the statement expressing a fact is the image of the event preceding that expression.

(non-local) influence on each other. At the same time, the explanation can be considered non-local and in the sense that it is holistic. In fact, the correlation is not explained, but is accepted as an effect of the whole system.

Let's try to explain quantum correlation, namely from the point of view of contextual realism.

Let us recall that we consider the theory and, in particular, quantum theory as a Wittgenstein rule, i.e. a conceptual scheme rooted in the reality of its applications (thus, although we are talking about applying theory as a rule allowing us to make predictions, the position is not instrumentalism, but a form of realism) [Prissy 2012]. Quantum theory tends to "describe", "explain" and predict phenomena in a generalized sense of these terms.

Wittgenstein (see Nachlass, Manuscript 160) indicates the existence of two kinds of rules, the difference between which is "grammatical", that is, logical in a broad sense: the rules of chess belong to the first kind, and the rules of cooking - to the second kind.

Nothing corresponds to the rules of the game of chess in reality. They do not reflect the nature of chess pieces, as the latter do not have a nature independent of them, do not describe the chess game, and constitutionalize it. In this sense, these rules have no nature.

On the contrary, "the rules of cooking and roasting must be appropriate to the nature of the meat", have real conditions of eating without which the purpose of cooking will not be achieved (see quote and analysis in [Benoist 2017: 129]). The reality in which they are rooted imposes constraints on the choice of these rules. However, the correspondence we are talking about here is not a mutual correspondence between the wording and "external reality", not isomorphism. In a generalized sense, however, one can say that the rules "reflect" (or describe) the nature of food.

In terms of the known difference between knowing what and knowing how, knowing the rules of chess or cooking rules is knowledge-kak (playing chess or cooking). It's practical knowledge. Since we are talking about "knowing" the rules, we can also say that this is "grammatical knowledge" in the practical field.

Wittgenstein refers to the "grammatical" knowledge proper, for example, the knowledge that the same surface area at the same time can not have different colors. At the same time, he gives the notion of "grammar" a literal meaning (thus revealing its true essence with his examples).

The grammar is "autonomous" and outlines the limits of meaningful use of the language. Its autonomy does not mean that it is detached from reality, but on the contrary, it implies that paradigmatic cases of its real "realizations" have already been integrated into it: the network of real language, words and notions is such that the use of the sentence "This part of the surface is simultaneously red and green" or the use of the expression "greenish-red" is prohibited, nonsense. Nonsense is not constructed on the basis of semantics, i.e. the meaning of the concepts used, but on the contrary, the meaning of the latter is established on the basis of the primary syntax ("meaning is use"). Nonsense here is the same kind of nonsense as nonsense, such as the language structure "Green or". That is, there are no essentially different kinds of nonsense. Nonsense is a violation of the rules. (Nonsense should be distinguished from incorrect application of rules. Meaningless application of rules in the area where they do not apply is also nonsense. But such nonsense is tantamount to breaking the rules themselves.)

Realization of practical knowledge is like action. The correct application of grammar is an intentional action (with a "filled" intention - if we use the concept of filling an intention introduced by Edmund Husserl and interpret it in the sense of the second Wittgenstein philosophy as satisfaction of the norm/regulation. At the same time, intentionality plays the role of the norm [Benoist 2017]). The action is similar to knowledge, that is, knowledge-what [Williamson 2017 Acting on Knowledge].

(Theoretical) knowledge - which also implies knowledge of grammatical rules, that is, knowledge how to use them - knowledge-like. The difference between practical knowledge-like and theoretical knowledge-which is not crucial in this sense. In one case we are dealing with practical grammar, and in the other - with theoretical grammar. The rules for cooking roasts refer to practical "grammar", while the epistemic norms for knowledge in this context refer to theoretical grammar.

Proceeding from the above, further, if not specifically agreed, we are simply talking about Wittgenstein grammar, without making a distinction between the theoretical and practical areas.

It is precisely the rules rooted in reality, like the rules of cooking or, for example, context-dependent epistemic or linguistic rules, that is, rules that include elements of reality, and it is thanks to this that Wittgenstein calls "grammatical rules", which have relative autonomy rather than purely instrumental rules detached from reality. Purely functional rules, similar to chess rules, can be considered as limiting case.

The aforesaid is applicable to understanding of quantum mechanics as Wittgenstein rule (further: v-rules) - quantum Wittgenstein grammar [Prissy 2014].

Quantum rules, including quantum theory and, in particular, the concept of wave function, in a generalized sense correspond to the nature of quantum reality, which is not a metaphysical object reality, located "opposite" to the description of its quantum theory.

Quantum theory is knowledge-like, i.e. possession in the right, to a greater extent than, for example, classical mechanics, which in a certain sense literally reflects "external reality".

For example, the tangled wave function allowing to describe the known EPR-paradox (quantum correlation), not literally reflects an external reality (sometimes on it accents and speaks, that it is not real), and there is a rule rooted in a reality for carrying out of real experiment and prediction of its real probabilistic (and, in a general case, only probabilistic) results within known limits (it is so, for example, in world interpretations). But we can't say that it completely constituents the results of quantum measurements.

As mentioned above, the grammar for Wittgenstein is "autonomous." It's a logical autonomy - the autonomy of the norm. In the case of physical theories, this autonomy is expressed in our interpretation of physical theory as a Wittgenstein rule (c-rule) [Prissy 2014]. It should be emphasized that the rootedness of "grammar"/theory in reality not only does not limit its autonomy, but, on the contrary, is its condition. This is both a condition of its comprehension, resistance to insignificant empirical data that should be ignored, and the possibility of real new applications and predictions. There is no absolute autonomy. All real autonomy is rooted in reality.

This autonomy was expressed in Einstein's words that what is real is determined by physical theory. It doesn't mean that theory constructs reality. This means that it defines it in the sense that, on the one hand, it logically includes the reality of its paradigmatic applications (this is the well-known requirement of "unity in judgment", which Wittgenstein refers to) and, on the other hand, it identifies new dimensions, slices of reality as a reality described or explained by theory (it seems to us, in the spirit of Wittgenstein's philosophy, that the difference between description and explanation can be eliminated). In addition, as stated above, there is an empirical "reality" that should be ignored.

The above applies to the concept of an event. If by "event" we mean simply a fragment of reality (outside the application of quantum theory), it has no identity (in fact, there is no event). If an "event" has an identity, it cannot be absolute, predetermined, decontextualized, but assumes the use of quantum language (which does not mean that such use creates the event, reality).

So, our contextual viewpoint is that a certain event is identified within a certain point of view, as a result of applying concepts, theory. The idea of an event occurring before its theoretical description is wrong. The question of longevity (or non-locality) does not arise, as it may arise only if the concept of the event is such that the event is considered to exist, arising regardless of the means of identification (language, quantum theory, the concept of the wave function, and so on). "Correlation" is a decontextualized comparison of two measurements made by different observers in different contexts after they have taken place. It's a point of view. That is, there is no context in which the correlation itself is observed. The correllation that physicists talk about is not the correlation between some absolute events, but between measurements, or events as measurements.

So, we see any phenomenon as contextual (rooted in reality). In particular, we consider quantum correlation to be a contextual identification of a certain slice of reality defined by quantum rules.[31] Correlation potentially, i.e. in theory, exists until its concrete implementation. But until then, it's not real, not definite. With this understanding, it does not arise from some real process that has a language-independent identity and is only registered a posteriori with quantum formalism and ordinary language in practice. That is, there is no effective process of correlation occurrence until its identification in the language of quantum theory. If such a process existed, it would have to be described in theory (this is how the problem of understanding the reduction of the wave function arises).

Contextual viewpoint means that quantum mechanics is not a non-local theory. But it's not local either. Bitbol, for example, calls it a-local [Bitbol 2015: 329-330]. That is, a confusing wave function does not describe past, present or future correlations between events as if they existed regardless of the description. Localization in space and time occurs only at the application stage of the theory, refers to the pragmatic level. It only allows you to identify actual quantum events and determine that some events are correlated.

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[31] Semantic choices of non-communicative speakers in multiple discursive contexts may correlate according to the law of quantum correlation. This indicates the contextual nature of these correlations (for more details, see the following). [Bitbol 2019: 219]. For Bitbol, contextuality means relativity, or "correlation", of determinants [Bitbol 2019: 261-262]).

Beatbol rejects realistic epistemology in favor of "correlating". For him, physical quantities are relative. Their relativity can be seen in the period of scientific revolutions. During the "normal" development of science as a result of amnesia, physical quantities are absolutized. Bitbol believes that with the development of science objects and properties introduced at the previous stage of development are replaced by trans-relational invariants. This is a neo-Cantian approach in which only relations are objective and only laws and not objects are identified through experience [Cassirer 2000].

Like Bitbol, we are contextualists, but at the same time our position is realistic. The relative value can be considered as a conventional value. It does, however, point to some more general absolute value - relation, structure. From our point of view, it can also be interpreted as an absolute value in context. That is, the very nature of physical quantity depends on the point of view. For us there are both absolute (objects, properties) and relative values (relations, structures), which can change their character. All values are contextual, not autonomous. Absoluteness" is rejected only in the sense of "autonomy", regardless of the context. For example, in STO, in terms of absolute four-dimensional intervals and tensors, four-dimensional coordinates are not absolute, but depend on the reference system. At the same time, in each fixed reference system considered not as an external point of view on four-dimensional invariants, but as context, internal point of view, identification method, coordinates and time - absolute physical quantities.

Our position can be seen as a contextual interpretation of "fragmentationism" by Kit Fine [Fine 2005: 46]. From Fine's point of view, "STO shows that it is not Newton's idea of space-time that is erroneous, but the idea that there is only space-time". He speaks of "a plurality of physical spaces, each with a Newtonian structure".

First-person point of view in physics

Bohr raises the question whether quantum mechanics describes the experience in a comprehensive way [Bohr 1961]. Indeed, the evolution of the wave function described by Schroedinger's equation is insufficient to explain the occurrence of a particular event. Therefore Bohr supplements it with a space-time description of a quantum event that occurs at the moment of measurement. In fact, no theory can describe experience in a comprehensive way. Experience is real, and theory is perfect. Experience is not described by theory; it is integrated into its use, which is always promising. The subject consuming the theory is part of the physical phenomenon described by the theory. Such a position, however, is not subjectivism, since the introduction of the subject simply means taking into account the fact that any phenomenon implies some internal perspective. In this sense it is possible to understand Bohr's reproach to Einstein that the latter does not take into account the wisdom of his theory of relativity and preaches the idea of a detached observer ([Bohr 1961]. See references to Bohr in [Fuchs 2018]). In quantum mechanics, the observer is not detached from the phenomenon he observes.

Necessity of considering points of view of the first person not only in quantum mechanics, but also in physics in general, follows from consideration of the nature of language.

Like the words and expressions of ordinary language, mathematical and physical terms and expressions and theories are used in context. This allows us to describe an infinite variety of real things (ordinary, mathematical or physical), to express an infinite number of different truths, to anticipate and predict new phenomena. That is, words, terms, expressions and theories have no fixed (absolute) referees. That's what Wittgenstein means when he writes that...

> "The views of contemporary physicists (such as Eddington) are quite consistent with mine when they say that in their equations the signs have no longer any meaning (or reference), and that physics cannot lead to such meanings but must remain at the level of signs", are quite consistent with mine. [Wittgenstein, Philosophical Remarks § 225.] (Cited in [Bitbol 2018 Mathematical Demonstration].)

According to Bitball, Wittgenstein warns against the temptation to consider mathematical sentences as referring to "facts" of some specific kind, and mathematical symbols as designating objects of the Platonic world. Beatbol extends it to physics and its ontological claims. For Wittgenstein, we agree with Bitbol, signs (symbols) that appear in physical and mathematical theories do not have transcendental (i.e., absolute, context-independent) referents [Bitbol 2018].

At the same time, Wittgenstein makes the reservation: "To tell the truth (contemporary physicists) do not see that these signs have a meaning insofar as (...) the observed phenomenon immediately corresponds or does not correspond to them" [Wittgenstein, Philosophical Remarks § 225] (quoted in [Bitbol 2018]). Thus, for Wittgenstein mathematical and physical symbols nevertheless have sense. For Wittgenstein, as we understand it, "phenomenon" is a language game, i.e. the use of rule/norma (theory) in context, reality. Within the real thing, when the application of the norm is correct, the real thing itself is identified. In this sense, truth is conformity (a real thing, a real fact), and "meaning (referent) is use". "Phenomenon" in that sense isn't something superficial, visibility, sensory data or anything else. That is why, as Wittgenstein writes, "the phenomenon is not the symptom of something else, it *is the* reality" [Wittgenstein, Remarques philosophiques: 270] (quoted in [Bitbol 2018]).

Thus, Wittgenstein's statement about the "reality" of phenomena should be understood not in the sense of the absolutization of phenomena as something autonomous, as does phenomenology, but in the sense that the phenomena are rooted in reality, within the framework of phenomena are given real things themselves. Beatbol interprets Wittgenstein's quoted words as "an immanentist thesis". He also believes that Wittgenstein attributes this "thesis" to Bohr and other physicists of the early 30's, relatively symbolic and non-referential formalism of quantum theory [Bitbol 2018].

Bitbol thinks that Wittgenstein took only half of the consequences of quantum mechanics. He points out that even "the pure matter of the phenomenon" is not independent from "the theoretical project of investigation embodied by the instrument which defines and co-constitutes the phenomenon".

Perhaps it can be said, as Bitbol does, that the phenomenon is co-constituted by a theoretical project. However, it cannot be said that a thing (object) is co-constituted within the phenomenon. A thing that is given within the framework of a phenomenon is not conceived, even partially, by theory; it does not carry a "theoretical load", but is simply identified in its certainty.

The phenomenon is a conceptualized experience, the application of norms to the Feeling (f. le sensible). In the sense of its conceptualization, it is theoretically/conceptually loaded. But experience as such - the experience itself -

does not carry a theoretical load, has no theoretical (conceptual) component (see also [Benoist 2013 Le bruit du sensible]).

Within a conceptualized experience, i.e. a phenomenon or language game, it is possible to identify not only the object, but also a particular type of experience or even a singular experience. About such an experience as a "language game" (and not about experience as such - experience as a part of reality) we cannot say that it carries a theoretical load, co-constituted by concepts. It is simply identified by means of (phenomenal or theoretical) concepts, within the framework of theory. In particular, physical experimental data is what it is; it does not carry theoretical load, though in its certainty it is possible only within the framework of theory.

The phenomenon does not exist by itself. It is possible only within the framework of theory and its practical application by the subject. In this sense, theory and the subject "produce" the phenomenon. But this does not mean that we cannot be given (certain) things and experiences as they are.

Bitbol also believes that Wittgenstein makes a significant difference between physical signs and mathematical signs, arguing that the former at least make sense, which gives them a connection with phenomena.

Bitbol himself claims that there is a parallel between mathematics and physics. He believes that he goes further in asserting this parallel than Wittgenstein: "Just as, in mathematics, a proposition has no meaning independent of the demonstration which leads to it, in physics, a factual statement has no meaning independent of its formal, instrumental, and performative context. (Just as in mathematics a sentence is meaningless regardless of the proof it leads to, in physics the actual statement is meaningless regardless of its formal, instrumental, and performative context) [Bitbol 2018].

We agree that there is a parallel between mathematics and physics, between mathematical and physical statements and sentences. But in our opinion, that's exactly the parallel Wittgenstein is drawing. Mathematical statements imply a mathematical "life form". A true mathematical statement is a priori deduced in the framework of deductive mathematical theory. Similarly, physical expressions and phenomena imply a physical "life form". Their truth is established, proved with the help of physical theory and experience, which complement each other. The difference in nature of statements. In one case, we are dealing with mathematical norms, and in the other - with physical norms. In one case we deal with mathematical "language games" - applications of mathematical norms, and in another case - with physical language games - applications of physical norms. This means that both mathematical and physical statements and their truth depend

on context. By themselves, out of context (their proof), strictly speaking, they do not make sense, the referent.

Usually it is considered that physics is an objective science describing nature from the point of view of the third party in terms of necessary and objective laws of nature. Newton's mechanics describe and predict the movement of planets that are independent of the observer. In philosophical studies Wittgenstein notes that in physics, personal and index pronouns are not used. It would involve the unsub's direct involvement. In quantum mechanics, however, the concept of the observer plays an essential role, refers to the theory itself. The first-person point of view, as Fuchs writes, comes from the Copenhagen interpretation of Bohr, Heisenberg, Paulie, the point of view of John Wheeler, the information interpretation of quantum mechanics by Anton Zeilinger and Caslav Brukner, the relational interpretation of Carlo Rovelli, quantum Bayesianism (QBism) by David Mermin (N. Mermin). David Mermin), R¨udiger Schack and C. A. Fuchs.

Fuchs combines a set of interpretations of quantum mechanics, introducing the first person - subject, or observer - with the common term "participatory realism". This is not a kind of instrumentalism (anti-realism), but a new realism that generalizes the traditional notion of physical reality [Fuchs, On Participatory Realism].

In some aspects Fuchs' position is close to the anti-Cantian position of Einstein and late Wittgenstein:

> "The theoretical attitude here advocated is distinct from that of Kant only by the fact that we do not conceive of the "categories" as unalterable (conditioned by the nature of the understanding) but as (in the logical sense) free conventions. They appear to be a priori only insofar as thinking without the positing of categories and concepts in general would be impossible as breathing in a vacuum." (The theoretical attitude espoused here differs from Kant's attitude only in that we do not regard "categories" as invariable (defined by the nature of understanding), but as (in a logical sense) conventions. They turn out to be a priori only to the extent that thinking, without categories and concepts in general, would be impossible, as it is impossible to breathe in a vacuum) [Fuchs, On Participatory Realism].

This view is also similar to our view of "categories" (and "concepts") as Wittgenstein's "axial proposals" (and concepts rooted in reality, experience). The latter also have a logical character.

It's about a pragmatic perspective. This perspective on quantum mechanics is developed in the book [Giulio 2016]. The dynamicist perspective describes the behavior of systems in the outside world, without mentioning the observer (subject), and laws are seen as necessary objective laws of nature. Within a pragmatic perspective, the subject becomes part of the theory, and physical laws allow him to control physical systems [Giulio 2016: 2].

The pragmatic perspective is deeper. It is also applicable in classical physics. Chiribele and Speckens give the following example from thermodynamics [Giulio 2016: 2]. In Klausius' dynamic formulation, heat cannot flow from a cold body to a warm one, so that at the same time no other changes associated with this process occur. In Kelvin-Planck's pragmatic formulation it is impossible to create a cyclic mechanism, the only result of which would be the conversion of a certain amount of thermal energy taken from a heat reservoir into an equivalent amount of mechanical work.

Schrodinger's wave mechanics are presented in a traditional dynamistic form (the wave function "describes/presents" the state of an evolving quantum system), while Heisenberg's matrix mechanics are presented in an operational form of operators of physical quantities [Giulio 2016: 2]. The existence of these two equivalent notions means that quantum theory should not be interpreted either in terms of metaphysical realism or in terms of instrumentalism (anti-realism). The best view of it is contextual realism (ontology is contextual, identified with the help of the tool and theory), which is in fact indistinguishable from contextual instrumentalism (the tool and theory are rooted in reality, identify the ontology). The essence here is in the notion of rooted theory in experience, practice, reality, that is, overcoming the "failure" between theoretical (normative) and practical, real. Understanding of that means this rootedness that failure is overcome logically, allows to get rid of many philosophical problems of quantum mechanics and physics as a whole.

First-person viewpoint in physics is also necessary to understand the irreversibility of time, which turns out to be a pragmatic condition.

The birth of a new language game in a context is by definition not predetermined, which implies the possibility of "free choice". When we apply the rule, i.e. become a participant of a language game, perform an action, we move from the theoretical to the practical sphere. And that means that the reverse transition is impossible by definition. In other words, the language game (action) is irreversible. An action, if it is really an action, i.e. an action is intentional, is again by definition free. So it is natural, as Michelle Bitbol is doing, to understand the irreversibility of time by analogy with the way freedom is understood. Kant understands freedom as follows:

"(...) Every creature that cannot act except in accordance with the idea of freedom, that is why, in practical terms, it is indeed free, that is, all laws inextricably linked to freedom are valid for it, just as if its will, significant both in itself and in theoretical philosophy, had been recognized as free. I assert, therefore, that to every intelligent being who has the will, we must also attribute the idea of freedom, and that it acts only on the basis of that idea. (Kant Immanuel. Basics of Moral Metaphysics. (With a review of the book by I. Schultz. 1783) // Works in six volumes. - M. : "Thought". - T. 4. C. I. - — C. 211—310.)

Freedom, therefore, is not a metaphysical concept but a prerequisite for action. That is, the concept of freedom refers to the logic of action. By definition, we cannot act if we are not free. Therefore, the presence of free will does not contradict the deterministic theory of human body movement.

Similarly, the universality of symmetric (reversible) theory, such as quantum theory, is compatible with the pragmatic precondition of the irreversibility of time. Besides our theories, there are also our practices, actions that have their pragmatic background. Beatbol sees the irreversibility of time as a pragmatic prerequisite. He proposes the following equivalent of Kant's approval in the event of irreversible time:

"Et donnons l'équivalent de cette proposition pour le cas de l'iréversibilité: toute communauté humaine qui ne peut communiquer que sous la condition d'une asymétrie entre le fait et la prédiction est par cela meme, au point de vue pragmatique, réellement plongée dans un univers temporellement asymétrique, c'est-à-dire que toutes les lois qui sont inséparablement associées à une asymétrie temporelle valent pour elle exactement de la meme façon que si son fonctionnement eut été aussi reconnu asymétrique en lui-meme, par des raisons valables au regard d'une théorie physique des processus élémentaires" (any human community that can communicate only if there is an asymmetry between fact and prediction, due to this very fact, from the point of view of pragmatism, is really immersed in the temporally asymmetric world, that is, all the laws inseparably associated with time asymmetry are suitable for it exactly in the same way, as if its functioning was found to be asymmetric in itself based on the physical theory of elementary processes) [Bitbol 2015: 374].

So, time asymmetry (irreversibility) is a pragmatic prerequisite. Communication is only possible if the asymmetry between prediction and fact is accepted, which implies an asymmetry of time. Functioning of laws symmetric in time looks as if in force were performative laws asymmetric in time. In his book Bitbol shows the logical compatibility of theoretical symmetry of laws and their pragmatic and practical asymmetry [Bitbol 2015].

Contextual Realism and Modalities

In *criticizing the ability to judge,* Kant makes the assumption of the dual nature of man: sensual and intellectual. He writes [Kant, KSS, § 76]:

> "It is certainly necessary for the human mind to distinguish between possibility and reality of things. The basis for this lies in the subject and in the nature of his cognitive abilities. If the application of these abilities did not require two completely different things - reason for concepts and sensual contemplation for objects that correspond to these concepts - then there would be no such distinction (between possible and real).

On this basis, the main points of his position follow: 1.Dichotomy of effective and possible. 2.Effective refers to sensual intuition, and possible refers to understanding. 3.Both are implemented as a result of the limiting transition: effective - transition to nfra-human, possible - transition to superhuman (see analysis in [Bitbol 2015: 19]).

The above assumption is not the result of Kant's philosophical analysis. In addition, as noted by Bitbol, Kant breaks the balance between the sensual and the intellectual (spontaneous) and gives priority to the latter. For him, all opportunities coexist and are relevant in God's intellectual space [Bitbol 2015: Ch. 1]. Kant writes [Kant, KSS, § 76]:

> "Indeed, if our intellect were contemplative, its object would be only one thing - real; then there would be no no notions (which only mean the possibility of the object) or sensual contemplations (which give us something, thus not allowing us to know it as an object)".

> "All our distinctions between only possible and real are based on the fact that the former means only the belief (Position) of the idea of a thing in relation to our concept and in general to the ability to think, and the latter means the belief (Setzung) of a thing in itself (beyond this concept).

The division into actual and possible is overcome at Kant either by full intellectual actualization of all possibilities of representation of a thing, or by appearance of possibilities from pure receptivity, which does not contain any conceptuality, any understanding, including intuitive (it is possible thanks to time[32]).

Two ways of identifying Kant's capabilities: deductive and genetic.

A forward-looking view that analyzes possibilities - what can be - makes an explicit rule to which the event is subject and evaluates its possible applications. In Kant's case, these opportunities seem to be located next to each other in the intellectual space, rather than following one another, as in the case of a retrospective view. The rule kind of refers to the eternal. It's the perfect norm. But, in fact, it cannot be detached from its specific applications. Therefore, it also has to do with the sequence of realized events, which allow to form a "life form" for the rule and context of its use.

Within Kant's transcendental idealism, thanks to time, i.e. pure contemplation (intuition) rather than intellect, sensual perceptions are ordered as a sequence of events - elements of reality. (For Leibniz, on the contrary, the order of events is primary and time is secondary, defined as the relationship between events.) A retrospective view generates modal experience based on the analysis of the sequence of past events. He establishes that something might have happened sooner or later. It's a genetic way of identifying opportunities.

The Kant's dualist concept of modalities offers two different models of the possible: coexistence and sequence (for more details see [Bitbol 2015: Ch. 1]). Their correction and synthesis seems to us to be possible within the framework of contextual realism.

We reject the Cantonese division into two types of knowledge - dualism of (conceptual) understanding ("spontaneity") and sensual intuitive (receptivity). In return, we accept the assumption of a categorical difference between the ideal, intellectual and real, sensual. Sense, understanding, thought, (ideal) representation, description, point of view, perspective, identification, norm, rule, concept, theory, and so on belong to the field of intellectual. The felt is reality itself, not a sensual experience, beyond which may be a thing in itself.

Any actual event is not just given in its relevance as a phenomenon, but implies a certain trend - a rule (norm), the implementation of which it is. It indicates that the event could have happened differently, could have been different. In other words, the same basic conceptual structure could have another event. This real possibility is the special reality of the counterfactual event. This is the reality of the (already conceptualized) experience of the possible, accompanying the actual event. Wittgenstein's conceptual analysis - identification of rules, logic of phenomena. Knowing the rule implies knowing its possible uses: "It seems to us as if we should penetrate into the depths of phenomena, but our study is not aimed at phenomena, but, one might say, at the "possibilities" of phenomena" [Wittgenstein, FI, 90].

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[32] Kant's time, as we know, is not only a priori form of contemplation; it is multidimensional. In particular, it is a common source of two forms of knowledge. According to Mai Lequan [Lequan 2007: 138], "(...) in his *Critique of the Pure Mind,* Kant reveals a complex time that has several levels: pure intuitive time - the form of all inner and outer representations; time of the subject's original self-affection - a productive synthesis of the transcendental imagination, the common root of understanding and receptiveness; time as a simple scheme linking the concepts of understanding and sensual intuition; and time as the foundation of our objective experience of nature.

So, the event has an intellectual (conceptual) component. It is she who allows us to speak about the possibility: "something else could have happened (retrospectively)", "something else could have happened (retrospectively)". Conceptual, that is, the rule governing the "language game" contains the potential of the possible. The rule could (maybe) be applied differently. The real possibility is the possible application of a rule/concept. Thus, the real possibility is rooted in relevance. Therefore, the (real) experience of the possible is associated with it.

Such understanding of possibility differs from a priori (logical) understanding of possibility as not containing in itself a contradiction, and also from the physicalist understanding of possibility as not contradicting laws of physics. These are two intellectual understandings of opportunity. The similarity between them is that they are decontextualized. Borrowing from Wittgenstein terminology, let us say that such possibilities can be established (paradigmatic) possibilities within the framework of this or that life form. They're secondary. Real possibilities are contextual and, being rooted in facts, realities, as already said, are accompanied by experiences of the possible.

So, it makes sense to talk about the possibility only if there is the use of concepts, meaningful events-facts. "Event" as a naked singularity, that is, as an element of reality, has no "given". In "dazzling obviousness" (Bitbol 2015) such "event" also loses all meaning. So there's no point in talking about possibility.

On the contrary, the concept of "events" as a mathematical event (we have already mentioned it above) - a point in space-time diversity or an abstract sentence-fact - is a pure abstraction that is detached from reality. In this case, it is not clear how what is really happening could have happened differently, since there is no real experience of the possible, that is, there is no connection between the event and the possible.

An event as a phenomenon occurs in space-time or, in any case, in time. This is supposed to be the concept of the phenomenon. For example, the identification (true or false) of a certain sound occurs at some point in time, but not in space (although at this point in time the identifying subject is in some place that he can

take into account). On the contrary, a visual object is identified in time and space. The event as a phenomenon is "given" to the subject who identifies it. The unsub sees something, hears it, feels it and so on. It implies the presence of consciousness.

Let us show further that the interpretation of modalities in terms of contextual realism allows us to conclude that nothing is impossible in the sense that a hypothetical possibility that is really meaningful is a real (possible) possibility, and a hypothetical impossibility, if it is really impossible, is not really meaningful.

Let us make a distinction between what is (actual), what may be (possible), and what is impossible. Denial of impossibility is necessary.

For Alexius Mainong, something that is impossible (does not exist), such as a round square, is one of the object types [Meinong 1915]. For Franz Brentano, however, the thought cannot be directed at non-existent objects. Edmund Husserl introduces the concept of "filling the intention". For him, in case of a round square, the corresponding intention is not filled. Correcting Husserl's phenomenology, Jocelyn Benoit treats the intention as the norm and its "filling" as satisfaction with the norm. If the intention is "filled", i.e. the norm is not satisfied, it makes no sense to talk about an object that satisfies it. "Nonexistent object" is not an object at all, but a dissatisfaction with the norm [Benoist 2016 "Logique..." : ch. 6].

We interpret the content of the intentional as a correct application of the Wittgenstein rule (hereinafter referred to as "the rule") within a language game rooted in reality.

There is no point in talking about the limits of reality as such, about what is possible or impossible in the absolute sense. Modalities make sense only within the framework of the reality already conceptualized in one way or another - the "life form", i.e. in relation to its norms, the "v-rule", which is implicit in the language games related to it; they imply the use of concepts.

We interpret metaphysical necessity, i.e., conceptual necessity in the broadest sense (according to the nature of things), as a (conceptual) necessity in a rule, and metaphysical possibility as a possible use of a rule relating to the "grammar" (logical structure) of a life form [Princess 2014 "Illusions..."].

By "possible use of the rule" we mean "use", about which we can correctly *say* that it is possible (maybe, maybe so on). That is, we interpret the possibilities by means of a discarding scheme: "((...) may be then and only when "(...) may be" true. The corresponding modal statement ("language game") "(...) may be" associated with some (real) application of a rule, i.e. a language game stating some real state of affairs, identifying some real object. In this sense, what's probably not an object. The language of possible worlds is rather a figurative one.

Impossibility is the impossibility of applying a rule outside the scope of its applicability, corresponding to a life form; it is the impossibility of negating necessity (rule). Strictly speaking, it makes no sense, because the limits of meaningfulness are the limits of the life form. In other words, the impossible is not an object that has a special nature, different from the nature of the actual and the nature of the possible. In this, almost tautological sense, there is (does not exist) nothing impossible. Nothing is impossible in the sense of some *given, to* which there is no access in principle. But that's certainly not the point in which "anything is possible."

Since the form of life determines the kind of reality (and the kind of "naturalness"), everything looks as if the metaphysical impossibility was impossible due to the nature of the things that relate to it. Actually, for example, a square circle is impossible not because the circle has a special nature, as a result of which it cannot be square (on this nature our idea as if comes across, unsuccessfully tries to grasp, to realize a square circle), but because the concept of a square circle is meaningless from the point of view of concepts (norms) of Euclidean geometry. If we want to deal with a square circle, we should try to develop other concepts, to adjust our thoughts to a new subject, not vice versa.

Within the framework of the life form, which is a set of related family similarity language games, everything is possible and even much is predetermined. Besides, from the viewpoint of Wittgenstein perspective of dynamic language games and life forms there is a sense in which the impossible is possible, or, to be more exact, can become possible: the impossible can become possible from the point of view of the generalized c-rule (norm), the expanded life form (the concept of metaphysical possibility acquires, thus, wider sense), thus remaining impossible within the limits of the initial life form, that is in the sense of the initial c-rule.

It is known that within some naturally generalized metric geometry, a square circle is possible. That is, it is possible in relation to another norm, which, however, is not an arbitrary convention of a square circle, but a norm that has close structural, "natural" links with the Euclidean norm [Benoist 2017 "L'adresse..." : c" 5]. Contrary to the Euclidean logic, the metaphysical intuition aimed at finding a square circle ultimately turns out to be right.

The essence here is in the "natural" generalization (expansion) of mathematics, preserving the links, "family resemblance" with already established mathematical knowledge and having a *post-factum* justification. Such generalization is rooted in mathematical reality, it is a mathematical reality itself, there is no arbitrary convention. (The phenomenon of radical expansion of mathematical concepts is studied by Imre Lakatos [Lakatos 1967].) A square circle is possible, really exists, real, but not within the framework of Euclidean geometry but within the framework of geometry with another metric norm. (From a purely topological point of view, there is no difference at all between a square and a circle.) Thus, even what is "a priori impossible" is possible. Finding this opportunity implies action, not contemplation.

And vice versa, it may happen that in the new "reference system" what was possible is impossible. For example, the ratio of Heisenberg's uncertainty establishes the impossibility of simultaneous precise measurement of coordinates and impulse of a quantum particle. Incorrect interpretation may consist in the fact that such simultaneous measurement makes sense, the particles have precise coordinates and impulse values but cannot be accessed. It's an attempt to squeeze a new reality into old ideas. The impossibility here is the logical impossibility of applying classical mechanics as v-rules outside the field of its applicability.

New rules (norms) as well as new objects are not predetermined; they are developed in a reality that is always superior to these language games and life forms. They relate to new contexts and their application also depends on the context. A correct view of modality implies contextual realism, rejecting metaphysical realism of predetermined objects, properties, relationships, and structures, and in essence mixing normative and real by the substantiveization of the former.

The metaphysical realist is a dogmatist; he tries to set fixed boundaries for the possible. The idealist, on the contrary, tries to overcome any borders too quickly, breaks away from reality, operates with pseudo-concepts. Both absolutists, though. Both appeal to decontextualized ontology, disregarding the contextual nature of modalities.

Absolutized modalities are considered as specific objects. But opportunities and impossibilities are not objects. To speak about the objective existence of possibilities and impossibilities leads to erroneous assignment of the same status to the real, possible and impossible: everything seems to exist, but differently; everything seems to be real, but to a different degree.

Thus, our view of modality is moderately deflacionistic, emphasizing correct use of language but rejecting conventionalism (true thought and true language game, i.e., real action rather than something imaginary, cannot be conventions). It doesn't reject ontology, it contextualizes it.

"Modal substitution realism."

According to Michel Bitbol's "modal realism of substitution", the concept of "effectivement survenu", that is, an event that occurs before its linguistic and theoretical description, should be discarded as inapplicable in quantum mechanics [Bitbol 2015: ch. 5]. This allows the concept of locale to be preserved in quantum mechanics.[33]

Quantum correlation is, of course, the real correlation between experimental events - between one "here and now" and another "here and now" (maybe at the same time "now").

If to assume that quantum correlations an essence of correlation between independent events (events-substantsii) which have the general reason, a riddle and a dilemma - either range of action, or nonlocality - continues to remain. Since the classical causal link between events should be excluded, so should the classical notion of what these events represent, the classical ontological status.

If one rejects the idea of the event as a certain "object" (in the general sense) situated in the "outer world", which really exists in the sense of a well-defined existence before it is expressed as a fact, one should admit that a certain event exists only at the moment of its identification by quantum rules. Correlation is simply the implementation of the rules of quantum mechanics, allowing to organize quantum experimental practice and predict its result (correlation).

This is not instrumentalism, or pure instrumentalism, as the existence of quantum objects is recognized. For example, as a result of the measurement, it turns out that the quantum particle really has this or that spin. Spin is a real property of a real existing quantum particle.

"Modal Realism of Substitution (or Participation)" takes into account the practice of the subject applying the theory and participating in experimental practice. Its wording is conditional, not categorical. It involves the participation of a cognizing subject.

According to Beatball, the only thing we can say about reality is this: 1) If the experimenter makes these and those preparations and makes these and those measurements, then the community will observe these and those with a probability that follows the Born rule. 2) If the experimenter prepares a tangled wave function and participates in the measurement, a correlation will be observed [Bitbol 2015: 335-336]. Wave functions "explain correlations" in the sense that they describe conditions under which correlations will be observed. In this sense (and only in this sense) these functions are real. We say that they are "rooted" in reality, that is, they have real conditions of their application.

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[33] The notion of locale in quantum mechanics also tries to save Carlo Rovelli and [Rovelli 2018]. Rovelli refers to a relational interpretation of quantum mechanics. For him, there are only quantum events "here and now" (that is, ontology is admitted, pure instrumentalism is rejected), and theory only establishes a relationship between them [Rovelli 2018].

The principal difference between his approach and, for example, David Lewis' modal realism in terms of possible worlds transforming intensional into extensional, is that for Bitball, all expressions imply involvement, participation of the one who makes them, participates in the cognitive process. The formulation of such modal realism, which includes an acting and cognizing subject, is conditional rather than categorical [Bitbol 2015: 335].

Thus, a non-classical theory such as quantum mechanics requires a non-classical understanding and a non-classical concept of reality. It requires taking into account the pragmatics of the subject's use of language, including the language of theory, and the practice of experiment and application of theory.

In everyday life and in classical physics there is a misconception that the fact expressed in language reflects a certain meaningful event that took place in the world independently and before its linguistic or theoretical formulation. It contradicts the pragmatic point of view. For example, for John Dewey, there is no isolated object or event in real life experience. An event or object is always this or that part, this or that aspect of the world or situation. That is, the event depends on the situation, the context (see link to Dewey in [Bitbol 2015: 337-338]).

"Fact" does not refer to a singular predetermined (self-conscious, self-determining) event. The fact determines it. In this sense, the event is not autonomous, regardless of the relevant fact. From the point of view of quantum mechanics there is no dualism of fact and event. Quantum fact differs from the classical fact in that it assumes pragmatic conditions of its existence, does not formulate a predetermined event independent of it.

"(...) Les événements ne doivent leur singularisation qu'aux normes régissant l'énonciation des faits. Les événements ne sont rien *en dehors* des faits; les choses qui *arrivent dans le monde* ne le font pas indépendamment de *ce que nos énoncés énoncent*" (events owe their singularization to the rules governing the announcement of facts. Events are nothing *beyond* facts; things that *happen in the world do* not happen no matter *what our statements announce*) [Bitbol 2015, p. 339].

What's said may look like idealism. But this is not idealism, but the "modal realism of Beattle's substitution": the statements of quantum physics are devoid of reference only in the classical sense. The reviewer of a statement is not isomorphic to the statement. There is no one-to-one correspondence between a statement and a reviewer, an event and its linguistic representation. In particular, a classical event is not a quantum referent. But that doesn't mean there's no real reference. In quantum physics the referent of quantum description is everything that can be referred to the real - the sequence of events arising in experiments, regulated by the law of probability, that is, such possible events with such probabilities. Isolated, that is, taken out of context, completely autonomous, absolute objects or events do not exist [Bitbol 2015, p. 340].

For Beatball, in a sense, wave functions are "real." We understand this reality not in the metaphysical sense of simple correspondence to a certain reference, but in the sense of rooting in reality. The wave function determines some real conditions (and is determined by them) under which certain measurement results can be observed with some or other probability. In other words, it is still possible to talk about the referendum, but the referent turns out to be of a more complex nature than in classical physics.

It is the assumption that there is an intimate connection between theory and reality that makes it possible to deny that a position is instrumentalism. The wave function is not just a mathematical tool for prediction.

The actual purpose of theory is to establish a meaningful connection between us and reality, to allow us to consciously navigate in reality, something meaningful to do. This connection is not necessarily presented as a reciprocal reflection of "independent reality". In general, it describes real conditions under which action, application of theory and, in particular, prediction of phenomena is possible. A successful theory expresses the logical structure ("grammar") of real practice, within which real quantum phenomena are identified.

Quantum Ontology

In § 242 of the *Philosophical Studies,* Wittgenstein writes:

> "Linguistic understanding is achieved not only by the consistency of definitions, but also (strange as it sounds) and consistency of judgment. It seems to eliminate logic; but nothing like that happens. It is one thing to describe measurement methods, another to mine and formulate measurement results. And what we call "measurement" is also determined by the known constancy of the measurement results."

Consent in Wittgenstein's judgments is agreement on well-established language games and life forms. Without such consent, neither mutual understanding nor judgement is possible. Such consent presupposes already developed ontology: within the framework of well-established language games some or other real objects (not necessarily visual) are identified.

Wittgenstein's pragmatic approach differs from the semantic approach to ontology, in which metaphysical realists claim the existence of a predetermined primary reality of well-defined individuals, their properties and relations between them, which are reflected in a secondary way in language, and anti-realists claim that ontologies are formed from initially shapeless visibility as a result of language choice and use. Obviously, that's two extremes. Their origins can be understood within the framework of contextual realism, which removes them.

The distinction between appearances and real being that we find in Socrates, Plato and Aristotle, and, accordingly, the understanding of ontology as real being, disappears within the semantic approach.

The problem with the semantic approach is that it neglects pragmatism. Wittgenstein's pragmatic (contextual) correction makes it possible to eliminate the insoluble opposition between realism and idealism (anti-realism). The use of language is contextual. It does not construct, but identifies things (objects). Accordingly, things acquire certainty (become objects) only as a result of such identification in the context. They are not predetermined, as the metaphysical realist claims. Non-contextual within known limits is not ontology, but theoretical and experimental methods used to describe and predict quantum events.

Similar conclusions are reached by Bitbol [Bitbol 2015: 439]:

> "(...) la référence ne résulte ni du découpage préalable et arbitraire du continuum de l'apparaitre en unités de sens, ni d'une mise en correspondence passive des mots avec les choses préexistants; elle s'appuie sur une stratégie d'anticipation perceptive et instrumentale. " (The referent is neither the result of preliminary and arbitrary division of the visibility continuum into semantic units, nor the establishment of passive correspondence between words and predetermined things; he relies on the strategy of perceptual and instrumental anticycling.

Beatbol continues:

> "Ce qui rend une référence pertinente, c'est le fait que le locuteur, en prononçant un nom, s'engage à fournir à son partenaire suffisament d'éléments pour qu'il puisse d'une part identifier dans l'avenir ce qu'il désigne, et d'autre part rattacher ce *designatum à* des documents concernant son passé", that the speaker, when saying his name, gives his partner enough elements so that he can, on the one hand, identify what he means in the future and, on the other hand, attach this *designatum* to documents relating to his past).

The contextual (pragmatic) approach makes it possible to establish links between different concepts of ontology. This is not surprising, as different ontological concepts have emerged as a result of ignoring pragmatics. In particular, Bitbol shows that the pragmatic approach establishes a link between the semantic, phenomenological and Aristotelian concepts of ontology.[34]

Science does not give us knowledge about new properties of the same (predetermined) things of the "outer world" to which it is asymptotically approaching. It gives us knowledge of new sections of reality. The share of the truth of anti-realism is that we can choose (but not create!) these slices of reality in a certain sense, by choosing this or that description language, this or that experimental method of research, this or that norm, this or that life form. Within certain limits, we are able to choose our own norms and pave our own way in reality. (A known share of skepticism here is that we are originally already part of a certain life form. We can't change life forms like gloves.)

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[34] Aristotle's position is closest to that of contextual realism. For Aristotle (cf. his part 4 of the book G of his Metaphysics), according to Obenque, "Tout langage, non en tant que tel mais dans la mesure où il est compris par l'autre, est (...) une ontologie" (every language, not as such, but to the extent that it is understood by others, (...) ontology) ([Aubenque 1977: 131-132], quoted in [Bitbol 2015: 442]). Beatbol understands these words in the sense that the language creates a "foyer" in which there are "anticypations and intentions of interlocutors". Aristotle calls these foyers substances (Greek for "*ousia*"). Pragmatic Genealogy explores how the roots of language in pragmatism can redefine Aristotelian "foyers".

The combination of "modal substitution realism" and quasi-realism

Michelle Bitbol rejects a predetermined datum of existence that quantum mechanics could capture or describe [Bitbol 2015]. This is the similarity of his position to contextual realism. At the same time, he rejects the notion of a theoretically independent reality, which the theory describes, thus getting closer to neo-Cantism. More precisely, Beatbol interprets quantum mechanics by combining his "modal substitution realism" with the quasi-realism of Simone Blackburn. (See, for example, [Blackburn 2002].) The former denies that reality itself is an object or consists of predetermined objects in the image and likeness of the objects of everyday life around us. In essence, it is a rejection of metaphysical realism. The second is the initial metaethical position. But it can be seen in a broader context, in particular with regard to the philosophy of science.

In ethics, the position of quasi-realism is an attempt to pave the middle ground between emotivism (expressionism), which states that ethical statements are the essence of the expression of emotions that have no true conditions, and metaphysical realism (platonism), which states that they express predetermined (absolute) ethical facts and can therefore be true or false. Quasi-realism accepts that an ethical statement implies a choice of installation, but at the same time accepts that within that installation it is true or false. More precisely, according to the quasi-realist, an ethical statement looks as if it were asserting its truth.

The quasi-realistic component of the interpretation of quantum mechanics proposed by Bitbole refers to the level of objectification. Within the limits of a choice of this or that experimental and theoretical installation this or that quasi-ontology arises (whereas initially, i.e. before carrying out this or that quantum-mechanical experiment, measurement of this or that physical quantity it was possible to speak only about potentials, dispositions).

In our opinion, the combination of "modal substitution realism" and quasi-realism suggested by Beatbole fits well with the contextual realism developed by Joslyn Benoist and us [Benoist 2017], [Prissy 2018]. Moreover, contextual realism makes it possible to improve Beatball's point of view, to understand it as truly realistic, completely freed from neocantiantism. Bitbol's pragmatic interpretation of Everett is also best articulated within the framework of contextual realism [Bitbol 2015], [Chain 2016].

From our point of view (unconceptualized) reality as such has no specific nature (it makes no sense to talk about its nature). Quantum theory identifies a special section of reality - a quantum reality that has its own nature (since quantum reality is already an area of conceptualized reality). In turn, this or that particular quantum state identifies a particular section of quantum reality. In the process of measuring a physical quantity, one or another, perhaps even more specific, reality is identified. We understand this identification, accompanied by a "reduction" of the initial function wave, as a contextual identification rather than a substantive "process" of measurement. Quantum reality nature is probabilistic and dispositional. This is not a visual object or a visual object.

Note that the concept of "context" that we use here indicates that it is the identification of a certain quantum reality (and not the physical process of "reduction"), which at the same time appears to be defined only as a result of this identification, that is, it is not predetermined, did not exist as an object before its identification. Contextuality means lack of certainty, lack of predetermination. The[35] word "identification" emphasizes that it is not a question of constructing reality, a real object.

Bitbol believes that the concept of an object in quantum mechanics does not apply. But we are expanding the concept of the object. For us, the object is something that has certainty, identity. Any identification by any concept in this sense is the object. For example, the wave function, although it does not identify (describe) the object in the sense of a visual object of classical mechanics, identifies the object as a certain dispositional reality (which, we note, is also not absolute, but depends on the context of observation (see, for example, section 5 below)). The concept of the object, however, does not apply when it comes to reality as such.

Within Everett's interpretation all possible results of measurement of this or that physical quantity are as if present simultaneously. This must be understood in terms of potentials, dispositions that are not reducible to something more fundamental.

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[35] Bitbolle highlights three levels of relativity (contextuality) of the observed physical quantities: dependence on 1) choice of measuring devices, their type (it is possible, for example, to measure position of a quantum particle, its impulse or spin); 2) activation of a measuring device when there is an actualization, i.e. a sudden transition from a superposition of states to a state with a certain value of physical quantity; 3) "consciousness" (von Neumann speaks about the "abstract self", which is a non-object, pseudo-object, non-physical *relatum* - a version of the transcendental Husserläu ego [Neumann 1964]). [Bitbol 2019: 262]. We are talking about a subject, or an observer, who uses theory in context (applying it to reality). Any use of concepts, application of theory, phenomenon assumes the subject who uses concepts, applies theory, observes the phenomenon. This is a logical ("grammatical") fact, taking into account which allows getting rid of transcendentalism and subjectivism. As a result, we are not dealing with relative values of physical quantities, but with their absolute values for real things themselves. "Consciousness" that accompanies the act of measurement has experience of real contact with reality. Such "consciousness" belongs to the category of real, not ideal, is part of reality.

For example, within the framework of the original interpretation of Everett, the state of quantum correlation of two particles is a combination of states of these particles. In this case, the state of each of them is not unambiguous, but is considered as relative to the state of the other. During the measurement, a relative state is updated. The multi-world interpretation (or interpretation that introduces many consciousnesses) of Everett's interpretation considers all possible states as simultaneously realized in different worlds (consciousnesses). We understand the relativity that Everett points out not as ontologically predetermined in different worlds or in some other way, but as a relationship to context. This or that particular correlation is implemented as a result of the measurement. And that means identifying her in context.

The "process" of measurement, on the one hand, presupposes the choice of this or that experimental and theoretical setting, and, on the other hand, the transition from the potential to the real, actualization, which has no relation to the field of applicability of the theory. In other words, the "process" of measurement is the application of quantum theory as a c-law, as a result of which the logical "failure" between it and reality is closed within a language game.

Our interpretation is consistent with Michel Beatball's position:

"'Reality' in a strong sense *can* (...) *be* characterized, but it is characterized no more than a 'substrate of absolute and nonreferenced potentials' for the 'available freedoms' of the experimental action " [Bitbol 2015: 459] (Bitbol refers to the ideas of Mugur-Schächter [Mugur-Schächter 1992].) This "potential substrate" is the most plausible meaning of the "universal state vector" of quantum mechanics according to Everett's pragmatic interpretation.

In Beattle, modal realism substitutions and quasi-realism complement each other. The wave function describes not an object, not a set of parallel worlds (or a split world), but a substrate of potentials, each of which can be implemented. In full accordance with the position of quasi-realism, it is implemented within the framework of a particular installation.

In other words, the wave function is a tool for quantum mechanical prediction. In this sense, it plays the role of a performative attitude. On the other hand, elements of its decomposition simulate ontology within the objectivating unit. These two

installations complement each other. The first setting corresponds to the modal realism of the substitution, since it introduces the reality of potentials instead of the predefined reality of objects with properties. The second is associated with quasi-realism of theoretical objects.

Thus, for Bitball, there is a dissociation between reality (as such) and ontology, reality and objects. Within the framework of contextual realism, this corresponds to the difference between reality as such, or the notion of reality, and this or that certain (in context) reality, contextual ontology. Reality as such has no conceptual dimension in the sense that it makes no sense to talk about it. That is, it does not have it in the sense that it does not have the positive property to have a conceptual dimension, but in the sense that the conceptual dimension does not relate to the concept of reality. On the contrary, ontologized reality is conceptualized reality.

Contextual Realism and Quasi-Realism

For Wittgenstein any word, including the word "good", has different uses (within language games). Wittgenstein writes: "Whenever you encounter such difficulty, ask yourself the question: how did we learn the meaning of this word (for example, "good")? On what examples, in what language games? And then you'll find it easier to understand that the word should have a whole family of meanings." [Wittgenstein, FI, §77]. That is, there is no single property "good" as G. E. Moore thought. If we accept this position, we can also conclude that moral assessments cannot be explained within the framework of a single moral theory [Sharp 2018]. In other words, for Wittgenstein, ethical statements, their evaluation and justification are contextual. There are moral principles that are defined by the "form of life" (common backround) and there are applications that can be true or false. The same idea is expressed in Cantian by Winch. He believes that Wittgenstein's philosophy contains both moral principles and moral sensitivity. For Wittgenstein, according to Winch, "the law without sensibility is empty [and] sensibility without law is blind" [Winch 2019].

Within the context of the contextual realism position that we adopt, which can be seen as an interpretation of late Wittgenstein's position, real things can have both physical and social and ethical dimensions. There are ethical facts (against moral eliminativism and reductionism), but these facts depend on context (against moral platonism).

In fact, the very existence of ethics - the science of how to do the right thing - requires realism and, therefore, moral realism: an act (action) presupposes the reality in which it is done; it can be right - and in this case we are dealing with a moral fact - or not. Moral realism can only be contextual, because ethical norms and their applications are not fixed once and for all, but are developed in reality and applied in context. Contextual moral realism, in turn, obviously implies contextual realism *tout court*. (For contextual realism in ethics, see [Benoist 2017, ch. 10].

Blackburn's position - "quasi-realism" (the term does not belong to him) - is inspired by the philosophy of late Wittgenstein and, in particular, the problems of following the rule. Blackburn even believes that late Wittgenstein can be interpreted as a quasi-realist [Blackburn 1981: 172]. In the spirit of late Wittgenstein, Simon Blackburn is trying to find out what we do when we use an ethical language [Blackburn 2002]. Explanation of the use of an ethical language is also the justification for its use. (Similarly, within the framework of contextual realism, the description of a language game is at the same time both an explanation and its justification, as it describes the correct application of a language game rule/norma).

Quasi-realism is a dynamic position on ethical proposals. The starting point is that the latter are seen as attitudes rather than descriptive statements. In the next stage, however, they are considered "as if" they were true statements. Bitbol believes that the quasi-realist starts with the anti-realistic tabula rasa and ends up as a "methodological" realist [Bitbol 1994].

Consider, for example, two proposals on causality [Bitbol 1994]. Quasi-Realist starts with a sentence (p1) "We should do the research as if all things had their reasons". It is a methodological proposal (regulatory principle). It does not claim that the reasons are real, but only that the research should be conducted as if the reasons were real. Quasi-realist ends with (p2) "All things have their reasons." It is a metaphysical proposal (a constitutional principle). It claims the reality of the reasons. The realist accepts (p2) and can therefore accept (p1). The reverse seems impossible. But from Blackburn's point of view, it seems impossible only for a realist (i.e., a traditional realist): "A principle can only be *constitutive* as opposed to a *regulatory one if there is an* area of facts whose constitution it is intended to describe" [Blackburn 1993: 26].

In terms of contextual realism, we interpret (1) as a choice of rule/norma. Namely the choice of norm (in case of philosophy of physics: choice of theory) within the limits of contextual realism corresponds to ethical installation within quasi-realism. The application of norm (theory) in context is either true or false. Similarly, the application of an ethical norm in a context that is true or false. The ethical norm itself is neither true nor false, but is an attitude. The norm, however, can be put in line with the "ethical reality" of established ethical language games. In that sense, she's true.

The application of a norm (setting) in Wittgenstein's language is a "language game", the analysis of which is necessary for understanding the meaning of an ethical statement. And indeed, Blackburn's quasi-realism combines expressionism with the philosophy of ordinary language. For Blackburn, moral language expresses attitudes. By making ethical statements, we do something. We express attitudes that influence our plans, intentions, behavior. At the same time, we speak as if our ethical statements were true, as if there was a normative (ethical) reality. That's why the position is called "quasi-realism".

Plato believed in the existence of an ethical reality. Quasi-realism, however, is not metaphysical platonism. Ethical facts are not metaphysical facts. Blackburn also rejects Aristotle's teleological position that ethical facts have a purpose. Within the context of contextual realism, an attitude, or norm, is not a predetermined natural purpose but a point of view, a perspective.

Quasi-realism is an explanatory strategy. It adds to expressionism the clarification of its genealogy, that is, the way in which some ethical position becomes an object of thought.

Blackburn's quasi-realism, that is, his expressionist (practical) approach, allows us to talk about knowledge, in particular, moral knowledge. For example, we know that the sentences "You shouldn't be evil with children", "Pleasure is better than pain", "It's better to be rewarded on merit than not" are true. On the contrary, not all of us know if the sentence "There should be a minimum wage for workers" is true.

The position of quasi-realism on the possibility of ethical knowledge is supported by deflazionism in relation to truth[36]. Deflazionism gets rid of the metaphysical concept of truth as conformity and thus brings together descriptive statements like "Snow White" and ethical statements like "It is immoral to torment animals". According to deflazionism, the sentence "Snow White" is true when and only when the snow is white. Similarly, we can say that the sentence "Torturing animals is immoral" is true when and only when it is immoral to torment animals, that is, when and only when we sincerely say (think) that torturing animals is immoral. (Blackburn speaks of the expression of installation.) Quasi-truth can thus be interpreted not as a substantive property, but as deflacionist truth, which is not truth in the sense of literal conformity (conformity in the substantive sense - theoretical reconstruction).

We interpret quasi-truth as conformity in context, as correct application of quasi-realistic installation in context.

We make a distinction between rules (norms) such as "Snow White", "Torturing Animals Immorally" and their application in context. The set of well-established (paradigmatic) applications of a rule determines its applicability area, the rule itself. Thus, we can say about the rule that it is (as if) true, corresponds to an ethical fact. It's the analogue of metaphysical truth in terms of conformity. Strictly speaking, rules (norms) as such are neither true nor false. True or false in their application.

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[36] The deflatsionist claims that the sentence (statement, judgment) "p" is true, if and only if p.

Contextual realism is a moderately deflazionistic position. Ontology is not rejected, but contextualized. For example, the phrase "Snow White" is true (or false) in context. At the same time, if in the context we correctly say that snow is white, it is really white, that is, the property "white" is its real property. Ethical statements refer to ethical facts and properties in the same way, in the context.

It should be noted that the choice can be made not only between correct (true) and incorrect (false) applications of norms, but also between the norms themselves, including ethical norms. The problem of choosing norms is similar to the problem of choosing a life form. In both cases, there may be radical disagreements that can only be resolved in practice.

Although quasi-realism is initially an ethical position, it can be transferred to other areas. For example, Blackburn uses it to understand how we can have knowledge about the probability of an event.

Frank Ramsey argued that when we talk about probabilities, we express a degree of subjective certainty and therefore believe that the sentence is true. The question remains, whether and how do we know that the sentence "Probability of event A equals p" is true? According to Blackburn's quasi-realistic position, an opinion (statement) about a probability that can be more or less justified, like any opinion, if sufficiently justified, can be knowledge:

> "People may ask: how do you know that the half-life of the radioactive atom is a hundred years? What could be the probability? I would say "Yes, you can." But there are confidences where you stand by. Suppose you don't know the probabilities, that you guess. But there is again the possibility of more and more solidly based until eventually you give up on the chance of improvement. That is when you start to talk of knowledge." (People may ask: can you know that the half-life of the radioactive atom is a hundred years? Can you know what the odds are? I say, "Yes, we can." There is a level of trust that you have. Suppose you don't know the odds of what you're just suggesting. But then again, there is the possibility of more and more reliably grounded opinions, as long as in the end you do not give up the chance for improvement. That's when you start talking about knowledge [Blackburn, Interview].

Schrodinger's Quasi-Realism

Bitbol believes that long before Blackburn, quasi-realism was developed by Schroedinger in physics [Bitbol 1994]. Schroedinger's philosophical position was neither realistic in the traditional sense, nor anti-realistic. Therefore some physicists and philosophers considered it realistic, while others considered it anti-realistic. On the one hand, Schroedinger preached "idealistic monism," while on the other he interpreted the wave function and other theoretical objects as "real" in the same sense that the macroscopic objects around us, such as tables and trees, are real. He understood realism in relation to the latter not in the traditional sense of predetermined objects of the "outer world", but in terms of pragmatic-linguistic. This allowed him to compare them with theoretical quantum objects, which are identified through theory and experience. Beginning with the derealization of the material objects around us, Schroedinger reasoned like an anti-realist. In fact, at this stage he established that certain macroscopic and microscopic objects (and objects by definition are certain) do not exist by themselves, so to speak in their autonomy or absoluteness, but only in context, that is within the framework of pragmatic-linguistic perspective, which makes objects out of things. At the next stage of development of the thought such beginning allows treating already theoretical objects as "real". At the same time, the "reality" of the wave function and other theoretical objects is nonmetaphysical. That is, the wave function, "representing" the quantum system, is not put into "correspondence" to it as some absolute reality existing in the "outer world". Schrodinger rejected the concept of "outside world." "I" and the world he observes are inseparable. In our terms, Schroedinger's theoretical objects turn out to be "real" in the sense of their rootedness in reality, that is, in the sense that they make it possible to identify in context the real objects of this or that species. Therefore, Bitbol sees in Schroedinger's reasoning, in his movement from initial anti-realism to subsequent "methodological" realism, quasi-realism in physics in the same sense in which Blackburn developed this doctrine [Bitbol 1994], [Blackburn 1993].

From our point of view, Schroedinger systematically allows the mixing of the ideal (theoretical) and real categories. At the same time, this blending turns out to be fruitful because it allows us to abandon the metaphysical picture of reality. In addition, at the next stage of reasoning, it is partially eliminated.

Indeed, as mentioned above, Schroedinger compares the reality of macroscopic objects with the "reality" of theoretical objects. It's anti-realism. The real is taken for the perfect. Then it is stated that theoretical objects are as real as macroscopic objects. That's anti-realism, too. Perfect is taken for real. There's a mix of categories. At the same time it is possible to interpret Schroedinger's demarche in terms of Blackburn: quasi-realistic interpretation of theoretical objects "as if" they were real, means that the wave function and other theoretical structures identify the reality of a species in the context. In the same way, strictly speaking, the reality of tables and trees is identified by our everyday concepts, which we have mastered since childhood and for this reason do not notice their presence.

In the transition from metaphysical anti-realism to "methodological" (i.e. not metaphysical) realism - the term used by Bitball - Schrodinger's wave function begins to describe, as if to "represent" the real system. The quasi-realistic "sort of" means that the described (represented) system does not actually have the status of an isolated metaphysical reality. At Schrodinger's, it's also true for tables and trees. They are "kind of" real in the metaphysical sense. In fact, they are real, "real real" and have a certain existence within our life form, but not in the metaphysical sense.

For Beatball, Schrodinger is "not a realist." If by this we mean "not a metaphysical realist", we agree. But if by this we mean a position that is not complete realism, then such a position can only be idealism or realism with an admixture of idealism. Bitbol also claims that Schroedinger's methodological realism is rooted in his metaphysical anti-realism. In a contextual interpretation, we would say that the ideal is rooted in the real, and that ontology is secondary to reality itself and contextual.

Bitbol believes that Schroedinger's next definition of reality is anti-realistic:

"(La réalité) se donne pour nous, en quelque sorte, comme la figure d'intersection des déterminations de plusieurs observateurs individuels - voire de tous les observateurs individuels concevables. Elle est un condensé de ce qu'ils ont trouvé dans un but d'économie de pensée" (Reality is given to us in some way as a figure of intersection of all determinants of numerous individual observers - and even all imaginary individual observers). (Letter to Einstein of November 18, 1950.) In: K. Przibram (ed.), Letters in wave mechanics, Philosophical library, 1967. Quoted in [Bitbol 1994]).

In our opinion, this is not a definition of reality, but a definition of how this or that certain reality is given to us in a phenomenon, a definition of our world ("life form") consisting of all kinds of "language games", phenomena. The reality is given to us in all kinds of phenomena that involve individual observers. The reality is what it is. That's her only definition.

So, true theoretical objects, not pseudo-objects, are rooted in reality. And only in that sense are they "real". They are perfect in themselves, they belong to the category of ideal. Theoretical objects - real settings, rules/norms that allow to identify real objects that in their reality are indistinguishable from macroscopic real objects such as tables and trees. The difference between them is not in reality or the degree of reality, as if objects of one kind were less real than objects of another kind, but in the nature of reality. The nature of microscopic vulnerability is different from the nature of macroscopic reality surrounding us. And Heisenberg understood that very well.

Believing that Schrodinger was a quasi-realist 50 years before Blackburn, Bitbol also sees similarities between quasi-realism in physics and the natural ontological installation of Arthur Fine [Fine 1986]. Neither position claims that scientific progress brings us closer to some predetermined final ontology of the physical world. Both positions easily explain Kunov's paradigm shift, presence or absence of transparadigmatic elements or structures. The difference between the two positions is that quasi-realism is a more flexible position. Where the "natural ontological unit" tries to preserve some of the ontology that is natural in its view, quasi-realism is easily ready to replace it with a more elegant or comfortable one. This is consistent with Wittgenstein's contextual realism in spirit, which we think is the clarification and deepening of the quasi-realism position. Blackburn also claims that late Wittgenstein can be interpreted as a quasi-realist [Blackburn 1981].

If Schroedinger's quasi-realism can be understood in terms of contextual realism, how far is his position from that of Heisenberg? After all, we also interpret this latter as pragmatism and contextual realism. One can also ask how instrumentalism and operationalism of the philosophers of Copenhagen interpretation is close to quasi-realism. It seems to us that the founding fathers of quantum physics differed much less in their philosophical views than it may seem at first sight. Their views, when carefully considered, are aspects of a deeper non-metaphysical position, which we consider contextual realism.[37] Their good knowledge of philosophy, quantum theory and physics in general was the key to this.

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[37] According to Howard Stein, "(...) there is no difference - no difference that *makes* a difference" [Stein 1989] between a cogent and enlightened "realism" and a sophisticated "instrumentalism".

Let us quote Heisenberg, for example [Heisenberg 1958, 1971: 188]:

> "(...)l'interprétation de Copenhague n'est aucunement positiviste, car, là où le positivisme prend comme base les perceptions sensorielles de l'observateur (...)), l'interprétation de copenhague considère que ce sont les choses et les processus descriptibles à l'aide des concepts classiques, c'est-à-dire le réel, qui sont les fondements de toute interprétation physique" (the Copenhagen interpretation is by no means positivist because it is there, where positivism takes the sensual perception of the observer as the basis (...) the Copenhagen interpretation considers that exactly the things and processes described with the help of classical concepts, i.e. the real, the basis of any physical interpretation).

As for Bohr, he sees the purpose of physics as not to reveal the true "essence of phenomena", but to try to establish relationships between the many aspects of experience [Bohr 1934]. Peterson quotes Bohr as follows: "There is no quantum world. There is only an abstract quantum-physical description. It is wrong to think that the task of physics is to discover what nature is. Physicists are interested in what we can say about nature" [Petersen 1985: 305] (quoted in [Mamchur 2014]).

Some authors interpret Bora as an objective anti-realist. Others are like a realist. Michelle Beatbol interprets Bohr's position as neo-Cantian in a broad sense. At the same time, Bohr, as we know, resorts to the concept of context in the interpretation of quantum phenomena. Therefore, the accusations of positivism and instrumentalism brought against him by Einstein and Schroedinger are unfounded.

As for Einstein's position, it is not metaphysical realism, as he was accused by supporters of the Copenhagen interpretation. Fine believes Einstein's position is "a natural ontological installation." We're talking about Einstein's non-metaphysical realism. For example, what Einstein himself writes ([Einstein 1936: 315]. Quoted in [Howard 2010]:

> "The only thing that's crucial is success in streamlining the empirical data. The rules for linking concepts should only be specified in general, because otherwise it would be impossible to know the type we are trying to obtain. These rules were compared to the rules of the game - the rules that are arbitrary in themselves, but the certainty of which first and foremost makes the game possible. However, this rule setting can never be definitive. Rather, it can only be argued that it is suitable for the intended field of application (that is, there are no latter categories in the sense of Kant)".

Einstein's quoted words contain both the concept of the rule and a comparison of the rule's application to the game and an indication of the need to take into account the rule's areas of application. The "rules of the game" that Einstein is talking about is the Wittgenstein language rules.

Relational interpretation of quantum mechanics and contextual realism

"In theory, there's no difference between theory and practice. In practice, there is" (in theory, there is no difference between theory and practice. In practice, it exists) (Yogi Berra). Quoted in [Criel 2019]).

In this section we offer a contextual realistic interpretation of one of the most popular modern interpretations of quantum mechanics - Carlo Rovelli's relational quantum mechanics. The fundamental point is to correctly understand the concept of reality and take into account the categorical difference between the ideal (concepts, theories, observers) and the real (application of theory, real objects, observable systems). The consciousness (subjectivity) of the observer within our interpretation does not play any metaphysical role. The proposed approach may also be understood as a return to the Copenhagen (in the broad sense) interpretation, adjusted within the framework of contextual realism. In our opinion, later interpretations were worse than the original interpretation of the founding fathers of quantum physics. Contextual realism makes it possible to get rid of metaphysical problems faced by various interpretations of quantum mechanics, including relational, to give a nonmetaphysical interpretation of a quantum event that occurs when measuring physical quantities, as well as realistic and local interpretation of quantum correlations.

1. Introduction.

The truth is not unambiguous and is learned in various ways. Philosophy, like the natural sciences and mathematics, seeks its truth, which is important not only in itself, but also for other sciences. In theoretical physics, for example, progress can be made in empirical, mathematical and philosophical ways. Understanding of what is reality, how to distinguish real from unreal, what is theory, how theory corresponds with reality and other philosophical problems is necessary for progress in fundamental physics. In particular, despite the lack of experimental data, progress in quantum gravity theory is possible as a result of the interaction of philosophy, physics and mathematics.

However, no conceptual scheme is a universal *tout court*. Each has its own area of application, in which it is universal by definition. This area is not predetermined, not delineated once and for all, but established by experience, depends on the context, that is, the specific conditions of research, cognition of reality. It also implies the existence of well-established, paradigmatic applications of theory that determine the true elements of reality. In quantum mechanics, these include predictions of the theory that have a probability of one. The Born rule also points to elements of reality - real quantum dispositions, which are implemented with one or another probability.[38]

For the elements of reality within this theory, we will use the term "beables" introduced by Bell. Bell formed the term "beable" from "be-able." He contrasted it with the term "observ-able" [Bell 1993: 174]. For Bell, the Bible is the fundamental authentic elements of reality in space-time, primitive ontological *posits*. The "bibbles" include macroscopic conditions of preparation of quantum experiment and data obtained during the measurement. For him, "Bible" also means "physical" in contrast to "non-physical" [Bell 1975]. It is clear that a full realistic interpretation of any theory should be built on the basis of "Bible".

We register the elements of reality on a classical macroscopic level, not a microscopic one. In one of his articles, Bell quotes Bohr [Bell 1975], [Bohr 1951]: "It is important to recognize that no matter how far phenomena transcend the field of explanation of classical physics, the description of all obviousness must be expressed in classical terms". We accept that Bora's position. "Obviousness" is the obviousness of a phenomenon within the framework of which both a classical object and a quantum one can be given (in the latter case the phenomenon can be conventionally called "quantum"). The phenomenon itself, however, is defined in classical terms. That's the definition we find at Plato and Aristotle.

Plato realized that "phenomenon" implies the difference between visibility and reality and therefore has a normative dimension.[39] It presupposes judgment according to the norm (rules, concepts), which is made by a "classical" subject. If the judgment is correct, visibility corresponds to reality. Aristotle developed the concept of the phenomenon. For him the phenomenon is someone, at some point in time, in some way and under some conditions [Benoist 2017]. Using Wittgenstein terminology, we will say that the phenomenon is a norm/regulation regulated "language game" in which the real object is identified [Chain 2018A, 2018B].

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[38] De Rond proposed the following reality criterion [de Ronde 2016]: "A generalized element of physical reality: If we can predict in any way (i.e., probabilistic or reliable) the value of a physical quantity, then there is an element of reality corresponding to that quantity. In other words, the probability of the value of physical quantity is also an element of reality. The Born rule provides objective information about the theoretically described (potential) state. It doesn't mean that the particles behave internally randomly. Objective probability characterizes the property of conceptual representation. This allows you to separate the wave function from the observer and its selection. The Born rule gives full knowledge both in cases of measuring a specific value of a physical quantity with a probability of 1 and in cases of measuring it with a probability other than 1. Pure and mixed states provide the best possible knowledge of the system status. None of the states are "less" real. No need to distinguish between pure and mixed states. Mathematical formalism does not allow it.

[39] For Stoics, who opposed platonism, the fundamental reality is feelings, not ideas. Feelings can be authentic and unreliable. But they're not fooling themselves. Visibility can mislead us because our contractions about sensations may be false [Russell 2018: 429]. This position comes close to the normative (and realistic) interpretation of Platonism, according to which the (ideal) norms measure reality [Benoist 2016], between which there is no distance between it and the perceived (in the sense of f. le sensible) [Benoist 2013]. So it is not surprising that, as Russell notes, the early Stoics were materialists, but later under the influence of Platonism they departed from materialism [Russell 2018: 403].

In quantum physics, the role of norm-rule is played by quantum theory, and the role of quantum phenomenon is played by application of theory [Prissy 2014A, 2014B, 2018A, 2018B]. The theory does not apply by itself. It's being used by the subject, "the observer." In particular, the observer prepares conditions of quantum experiment, observes quantum phenomena, measures quantum physical quantities. This, however, does not mean the presence in quantum physics of a subjective element or "consciousness" in the sense of some non-physical substance. The term "observer" means that there is an application of concepts, both quantum and classical, ordinary (since quantum concepts are generalizations of the classical, assuming classical concepts [Prissy 2012]). Concepts are developed in reality. But they're not real in themselves. They belong to the ideal category.

One can speak about "reality" of concepts (norms, intents, meaning) only in the sense of their authenticity if they are really authentic, not pseudo-concepts, i.e. in the sense of their rootedness in reality, context, or in the sense of existence of real conditions of their application [Benoist 2010].

The nature of this or that physical reality is revealed in concepts that allow it to be captured (described, explained, presented). Peculiarity of the quantum theory in that its physical quantities are noncommutation operators. This usually prevents them from being assigned simultaneous exact values, makes them discrete, probabilistic and observer dependent. The Kochen-Specker theorem, which complements Bell's theory [Bell 1964], argues that quantum mechanics, because of its uncomuttability, cannot introduce context-independent measurements of hidden internal parameters of physical quantities that would have certain values at any given time [Kochen 1967].

The dependence of the values of physical quantities on the observer is emphasized by Carlo Rovelli's relational quantum mechanics (hereinafter: RCM) [Rovelli 1996, 2016? 2018]. We argue that the best way to interpret it is contextual in the sense of contextual realism.

RKM rejects the absolute nature of quantum events, the state of the quantum system and its properties: a quantum event or a sequence of quantum events, the wave function of the quantum system and its properties are defined only from the point of view of this or that observer; it makes no sense to speak about them in an abstract way. In this case, the wave function is not "real", but plays a purely instrumental role of "ledger", which contains information about the quantum system, which has an observer. That is, the wave function is information about the system relative to the observer. "Reduction" of the wave function means a change in the information that the observer has, not a transformation of reality. For Rovelli, the individual quantum events recorded here and now by this observer are real. They arise as a result of interaction of quantum systems, exist only in interactions, and they are relative - real only in relation to the system involved in interaction. "Interaction" - a primitive notion. All systems, including observers and macroscopic systems, equal physical systems. RKM also claims that reality is internally relational, and quantum mechanics describes the relationship between quantum events. The existence of "internal" (absolute) properties that do not depend on interaction between systems is rejected in favor of relational properties. For Rovelli it makes no sense to talk about the state of an isolated system because the physical world is a network of interacting components [Laudisa 2007]. It is relations, not "objects", that represent the basic ontology of quantum reality.[40] Rovelli also sees this relationship as an information relationship.[41]

The RCM faces the following objections. The RCM asserts that different observers may provide different descriptions of the "same" sequence of events, which should therefore be absolute. Within the RCM, the absolute nature of the relationship is also maintained. Both are in conflict with the overall relational setup of the approach. In addition, the relations in question are understood naturally as relations arising from the interaction of systems. Another objection is that since the primary ontological status has relations of interacting systems, the question arises about the reality of the interacting systems themselves. Can we talk about the interaction of systems that are not real? And how a relationship can exist without the existence of what enters into that relationship.

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[40] Candiotto believes that quantum relationalism is an "ontical structural realism" that asserts the primary relationship and the secondary nature of objects [Candiotto 2017]. Van Fraassen interprets the RCM as "information structural realism" [Van Fraassen 2010].

[41] An important aspect of the RCM is that the theory is derived from the theoretical and information postulates. This was the impetus for the development of information approaches to quantum mechanics and, in particular, quantum bayesianism [Fuchs 2001-2018], [Baeyer 2016]. (An operational approach to reconstruction of quantum mechanics as a system of quantum bits, based on elementary rules of acquisition of information, is proposed in [Hoehn 2014, 2018]. See also the critique of the theoretical and information approach to quantum system as a set of questions that can be posed about quantum system [Wood 2010].) Quantum Bayesianism has something in common with ours that it sees quantum theory as a system of rules for interacting with "reality". In particular, quantum bayesianism attributes the Bourne rule to a normative rather than descriptive role. Our approach, however, is realistic. Our theory is Wittgenstein's rule (norm), which is rooted in reality in the sense in which Wittgenstein's rules, norms, and concepts are defined within the framework of the "life form" [Wittgenstein 1953, 2001].

Bitbol rejects the absolutist residue ("naturalization aporia") in the RCM. For him, the poles of relations themselves should be considered according to the logic of relational interpretation as a product of previous constitutional relations. Bitbol proposes to move from the naturalistic point of view to the transcendental one, replacing the interacting physical reference systems with physical (naturalized) properties, functional reference systems formed by relationships [Bitbol 2007, 2010].

However, if we limit ourselves to the Neo-Cantian point of view, we have to admit that the RCM is a kind of correlationism and, consequently, it denies the cognition of things themselves. A truly realistic position, on the contrary, asserts the possibility of knowing things themselves, not just things for us.

We criticize Rovelli's approach based on the categorical difference between ideal and real that we accept within the context of contextual realism [Benoist 2017], [Princess 2018A, 2018B]. For Rovelli, the interaction of physical systems produces real events, and through interaction, information is also exchanged. In our opinion, there is a mixture of categories: information, as well as knowledge, belongs to the ideal category (information and knowledge - information and knowledge about something real), while the interaction of physical systems - something real. It is another matter if by "interaction" we mean the exchange of information, i.e. not the perturbing interaction, but the "dimension" carried out by the subject. Indeed, some authors point out that since Rovelli's interaction is a primitive concept, it cannot be analyzed in causal terms.

Leonard Susskind argues that the Copenhagen interpretation of quantum mechanics, assuming the existence of one external observer and the collapse of the wave function, and the interpretation of Everett, introducing the multiplicity of observers, but not the collapse of the wave function, additional descriptions, which in a sense are dual to each other [Susskind 2016].

Beatbolle sees Bohr and Everett's interpretations as two extremes: Bohr tends to consider specific quantum phenomena ("phenomena"), while Everett is an abstract (theoretical) novel. The first instrumentalist. The second "realist": the

Everett abstract version of quantum mechanics is autonomous in relation to actual laboratory events. (Everett himself saw his approach as an intermediate between Bohr and Einstein's.)

Rovelli believes that his approach makes the Copenhagen interpretation of quantum mechanics more democratic, thanks to the equal treatment of all physical systems [Rovelli 2018].[42]

Our approach in a sense suggests a return to Copenhagen interpretation, adjusted within the framework of contextual realism, which takes a categorical distinction between normative (theory) and real (application of theory). In particular, the contextual approach gives a non-metaphysical interpretation of a quantum event that occurs when measuring a physical quantity [Bitbol 2015: 320]. This allows a realistic and local interpretation of the quantum correlation.

2. Relativity to quantum reality.

Usually classical reality is treated as absolute. For example, tables, houses and trees are believed to have "internal", absolute properties. They preserve these properties, regardless of the point of view. According to Rovelli's relational interpretation, quantum reality depends on the physical system interacting with that system and acting as an observer.

For example, with respect to observer P observing a measurement of some physical quantity A made by observer O over system S (and therefore interacting with system S) but not interacting with the composite system S + O (i.e., not making a measurement over it), the composite system's wave function will be confused and therefore the value of the considered physical quantity A of system S will be uncertain while for observer O this value will be definite. That is, "the same sequence of events", says Rovelli, can be "described differently"; two different observers see different things.

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[42] One of the RKM motivations is quantum gravity. Since the General Relativity Theory (GTO) is a relational theory, the creation of quantum gravity requires a relational interpretation of quantum theory. Within the framework of Rovelli's loop quantum gravity, the relationalism of the general theory of relativity is exactly what is combined with the relationalism of CM, and the only reality are the events that happen here and now [Rovelli 2018]. It should be noted also that a close connection between quantum mechanics and the general theory of relativity (GTR) has recently been established. For example, Vidotto shows that the quantum physical system can be identified with space-time area [Vidotto 2013]. Leonard Susskind also writes about the close connection (if not identity) between quantum mechanics and gravity. In particular, there is an equivalence of quantum entanglement (quantum correlation) and spatial connection between black holes through mole holes [Susskind 2017].

Rovelli interprets this situation as relativity of quantum reality (ontology) and values of physical quantities. On the one hand, quantum ontology is poorer than classical ontology - only what is really measured here and now - quantum events and the relationship between them - and on the other hand, it is relative.

Within the framework of relational quantum mechanics, wave function is not an absolute concept; in itself it does not describe (not represent) the state of the quantum system, understood as some absolute quantum substance ("actual stuff"). It depends on the observer and encodes the information available to the particular observer [Rovelli 1996, 2018].

The wave function Ψ plays an instrumental role; it establishes links between the values of physical quantities.[43] Rovelli writes, "Quantum mechanics is not about 'quantum states': it is about values of physical variables." (Quantum mechanics is not about "quantum states": it is about the values of physical quantities) [Rovelli 2018 "Space is blue..."]. That sounds positivistic. From the realistic point of view, the values of physical quantities refer to something real (they are only numbers in themselves), and any information - information about something (by definition). As Schrodinger writes, "personne ne perçoit deux mondes, un monde observé et un monde 'réel'." (no one perceives two worlds: the observable world and the "real" world) [Schrödinger 1982: 108].

Rovelli also writes: "The physical theory is concerned with relations between physical systems. In particular, it is concerned with the description that observers give about observed systems" (physical theory deals with relationships between physical systems. In particular, it deals with the descriptions that observers give of observed systems) [Rovelli 1996: 1955]. A relationship between physical systems, however, cannot exist if there are no systems that enter into that relationship. And descriptions (if they are really descriptions) describe something: descriptions of observed quantum systems describe these quantum systems. The said refers to the "grammar" of the notions of "description", "attitude". At the same time, the poles of relations can be considered not as independent of relations and external to them, but as formed together with relations. This is how Bitbol [Bitbol 2007] suggests interpreting the RKM. The neo-Cantian approach is a kind of "correlativeism" that rejects the existence or comprehensibility of reality beyond the correlative relationship.

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[43] One of the objections to the "reality" of the wave function is obvious: If the wave function is a real quantum state, then how is its instantaneous collapse possible, that is how is the instantaneous collapse of one physical state (one physical reality) into another possible? This contradicts the laws of physics and, in particular, the special theory of relativity.

Realistic philosophy of quantum mechanics should understand the nature of quantum reality. A quantum state, for example, can be imagined as some kind of disposition background, which is described by a wave function. It seems that Rovelli's position does not contradict this view of the nature of quantum reality. It should only be noted that the disposition background, like the wave function, itself depends on the observer's point of view. That is, a certain quantum system cannot exist in isolation from the observer. More precisely, the part of it that does not depend on the observer, is not identified by him, is not definite. It is this "part" that can be described in many different ways. As a result of the "reduction" of the given wave function at the moment of measurement in relation to this or that observer, measuring this or that physical quantity, this or that certainty arises. We will say that such reduction means moving into a particular context. That means we don't see it as an outrageous interaction. We say that any description of a physical system, any identification of a physical quantity is given in a certain context of this or that observer. Various specific quantum realities arise in different contexts.

The relativity of the quantum state in the sense of Rovelli can, as we believe, be explained by the example of the impossibility of cloning the wave function: only an observer who has prepared the wave function (state of the quantum system) knows its state [Pris 2014, Pris 2015]. An intruder cannot know the state of a single quantum system, even if it interacts with it. Let's take a closer look at this issue.

3. Wave function and quantum reality

As is known, the wave function suffers from the lack of objective reality in the following sense [Haroch 2007]. The wave function of a quantum system can be defined in a statistical context where it is possible to make measurements on its identical copies. In the case when we are dealing with only one single instance of a quantum system in the pure state ψ, which may be represented as the eigenstate (with eigenvalue 1) of some projector, the function ψ is known only to the experimenter who prepared it, but cannot be known to an outside observer. In fact, as a result of the measuring system, the system changes its state in an unpredictable and irreversible way. In this case, part of the information about the initial state is irreversibly lost. The experimenter only gets partial information about him. (The consequence of the lack of objective reality in the wave function is the impossibility to accurately copy (clone) an unknown state.

Thus, one should either acknowledge the existence of a reality that is unrecognizable from the point of view of an observer who was not involved in the process of preparing the wave function, or admit that the latter reality implies the presence of an interacting subject - observer: regardless of the observer, the wave function cannot be considered objectively real; quantum reality is the reality of the act of preparing the state of the system.

In the latter case, the concept "wave function" cannot be considered as a concept in the classical sense, but as a "quantum concept", the functioning of which implies the presence of an observer.

Thus, in quantum theory, concepts do not function as a means to represent the metaphysical reality of objects existing independently of the observer, but as rules for the interaction of the observer with reality and the formation of a classic "metaphysical reality" by the observer, which is secondary. The "Interaction" we are talking about will be interpreted as a "measurement" of (nonmetaphysical) reality in the context of [Pris 2014, Pris 2015].

Within contextual realism, the secondary "metaphysical reality" is the reality of identified quantum objects in measurement contexts. By "quantum objects" we mean objects in a broad sense: any defined (identical) entities identified with the help of quantum concepts, in particular, quantum physical quantities as having certain values in the context of measurement. The quantum system itself, interpreted as a disposition background and described by the wave function ψ, is a certain reality, an object in a generalized sense.

4. Criticism of Metaphysical Realism

The relativity of the wave function, physical quantities and events is obliged to the nonmetaphysical picture of reality. We share the critique of metaphysical ("strong") realism that Rovelli's approach contains.

Let's take a quick look at the background. In article of Einstein, Podolsky about Rosen 1935 on an example of quantum correlations (it is EPR-paradox) it has been shown, that locale and strong (metaphysical) realism are incompatible with completeness of quantum mechanics [Einstein 1935]. In 1964, Bell showed that EPR correlations are also not compatible with local and hidden parameters realistic theory [Bell 1964]. Based on this result, the conclusion was made that "local realism" was unsuitable. At the same time it has been established that quantum "non-locality" cannot be used for transfer of energy or information, i.e. it is compatible with STO. That is EPR - paradox does not mean "nonlocality" of quantum mechanics in sense of instant transfer of interaction or influence.

Within the limits of relational quantum mechanics (RKM) locality in sense of impossibility of instant transfer of interactions on distance[44] and at the same time the causal nature of quantum correlation remains at the expense of weakening of the traditional ("strict") realism ignoring the quantum nature. The "non-locality" of the quantum correlation established by Bell is interpreted as local, that is, the existence of a common cause, in a non-deterministic context [Martin-Dussaud 2018]. Quantum "non-locality" is thus only an illusion (see also the local interpretation of quantum correlation proposed by Bitbol [Bitbol 2015, 2019]).

Rovelli rejects realism in the "strong" sense, asserting that, just as it happens in classical mechanics, at some fundamental level at every moment it is possible to enumerate all the properties of the world and all the values of all variables describing it. That's what they call "metaphysical realism." (Realistic in a strong sense are, for example, multi-world interpretations of quantum mechanics, in particular, the interpretation of Everett, the interpretation of Bohm and other interpretations that introduce hidden parameters).

Within the RCM, physical quantities have certain values only at the moment of interaction between the observer and the observed system. Thus, quantum ontology is poorer than classical ontology: there are no individual (constant) quantum objects with internal (constant) properties, it makes no sense to say that something happens between quantum events[45], properties of quantum systems do not exist in the time interval between their interactions. As a result, it is impossible to define an individual object and at the point of space-time, it is impossible to characterize its properties to distinguish it from other objects. There are only properties of quantum events arising as a result of interactions. This raises the question of how a particular result is updated based on the prediction of the probability of possible results.

Within the RCM it is possible to compare the values of physical quantities with respect to different observers, but the accuracy of this comparison is limited by the Planck's constant [Rovelli 2018]. RKM asserts that in quantum mechanics, as well as in the general theory of relativity, there is no consistent global point of view. That is, quantum mechanics is a perspectiveist theory; any point of view is partial. RKM also rejects monism in the sense that one cannot speak of the quantum state of the whole universe (as Everett, for example, tries to do).

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[44] The concept of (non)locality is ambiguous [Martin-Dussaud 2018].

[45] Unlike classical mechanics, quantum mechanics does not describe (spatial-temporal) events (though it describes time events). They just don't make sense of it. In particular, it makes no sense to talk about certain quantum trajectories. A space-time quantum event only occurs when the position of the quantum particle is measured.

The RCM rejects a privileged observer role. For Rovelli, "All systems are: Nothing a priori distinguishes systems from quantum systems." (All systems are equivalent: nothing a priori distinguishes observer systems from quantum systems) [Rovelli 1996: 1644] According to Vernette, Rovelli's relationalism can be seen as the discovery of the "incompleteness" of the description of reality by any single observer, that is, the discovery of the "incompleteness" of the Copenhagen interpretation of quantum mechanics [Vernette 2006].

5. Ambiguity of Rovelli's position

In our view, Rovelli's criticism of the privileged role of observer is ambiguous. If it means that any physical system can play the role of an observer and vice versa - any observer can be an observer himself, then we accept it. At the same time, one should not forget the difference between the status of the observed and that of the observer. The first belongs to the category of real, while the second - to the category of ideal: the measuring instrument is material, but when applied as a measuring instrument, it does not play the role of reality by definition; "interaction" of the measuring instrument and the system being measured is not a physical process, but "contact", as a result of which information is acquired. Thus, an observer has "privileged" status in the sense that it belongs to another category. This status depends on the point of view: an observer can become observable, and vice versa.

Thus, on the one hand, the RCM eliminates the observer and observed dualism and the dualism between the classical or macroscopic system and the quantum or microscopic system, and on the other hand, it is a naturalistic position. The categorical distinction between an observer, on the one hand, and the "act" of observation/measurement and the observed system, on the other hand, is not taken into account. Fairly rejecting duality system/observer, quantum system/classical system, physical system/consciousness (subject), Rovelli at the same time does not take into account the categorical difference between normative and real, mixes them, naturalizes normative (ideal). The normative dimension of the observer is ignored.

6. Relationism and Relativity

Rovelli compares quantum relationalism with relativity in classical physics (to the analogy between quantum theory and the theory of relativity appeals also, for example, Everett). For example, the speed of a particle depends on the reference system, the observer. Similarly, says Rovelli, quantum physical quantities depend on the observer.

It seems to us that this comparison is not always successful. It needs to be clarified because quantum relationalism considers physical quantities to be absolute, albeit in relation to the observer. It may not be installed by another observer who is not involved in interaction with the system being observed. For the same reason it is impossible, as it takes place in classical physics, to enter some invariant, like a velocity vector which would have different "coordinates" for different observers. In classical theory components of speed of a particle depend on system of readout, but the vector of its speed is invariant. This invariant can be restored from the velocity components in any coordinate system. The procedure for measuring speed components in different coordinate systems is also irrelevant. In the theory of relativity, the invariants are 4-dimensional tensors. That's not the case with quantum mechanics. Quantum reality is pluralistic, allowing a single description for each observer that cannot be compared with other descriptions. [46]

The situation seems to change if we interpret the relativity of speed within the framework of contextual realism: speed depends on the context, the reference system, but in context, with a fixed reference system it is absolute. Another thing is that it is also possible to consider the reference system (context), in which values of speeds in different reference systems are compared. In this case, the speed values in each individual reference system lose their absolute character and become relative.

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[46] This does not mean that there are no invariants in the RCM. Without them, physical processes could not exist at all. In particular, it would be impossible to identify the "same" sequence of events. The role of invariants in quantum theory is played by mathematical structures and, in particular, the wave function. In that sense, the last one is "real." It's real in the same sense that the speed vector is real. But unlike classical reality of the velocity vector, which literally reflects physical quantity of velocity, i.e. the direction of movement and absolute value of velocity, the wave function is only "rooted" in quantum reality: only one of its components in linear decomposition on own functions of physical quantity literally corresponds to reality which is realized as a result of measurement of this quantity.

Van Fraassen identifies the following invariants in the RCM: 1) Each physical system is characterized by a set of questions that can be asked about it. In essence, it is a set of physical observables (or it is reconstructed based on this set). (2) The answers ("yes" or "no") that an observer receives to his or her questions about the system depend on the choice of the observer, since they are the result of interaction, exchange of information between systems, but for each fixed observer they are absolute, not dependent on another observer. 3) The probability of a positive (or negative) answer to a particular question about the system is independent of the observer. 4) Independence from the observer of "irrelevant" information (see [van Fraassen: 399-400] for more details).

True realism, including nonmetaphysical ("weaker") realism, cannot assert the relativity of reality or physical quantities. He can, however, assert the dependence of ontology and physical quantities on context. "Relativity" is relativity in relation to the context in which the observer finds himself. Relativity, understood as relativity in relation to an observer interacting with the system under observation, gives the impression that the initial state of the system under observation as a result of the interaction has been perturbed and cannot be observed: only its transformed state is observable - the result of interaction. In this sense, it is observed on its own condition, and the condition has already been observed.

In other words, as we constantly emphasize, Rovelli does not make an explicit distinction between the categories of ideal and real. For him, there is nothing to distinguish the observer system from the observed system. For us, they differ in status (which is also not absolute). If an observer is indeed considered an observer, he or she may not fall into the same category as the observed system. It's "perfect", and the system being measured is real. But the very status of the system depends on the point of view.

7. Relationism and Correlationism

Thus, it seems to us that Rowelli's critique of metaphysical realism is being dressed in idealistic and naturalistic forms at the same time, so that relationalism can be mistaken for correlationism, which states that we only have "access" to the subject object of correlation, not to the object and the subject itself, to the interaction (correlation) of the observer and the observed, not to the observer and the observed, to things already conceivable, not to things and thoughts as such, to interacting systems, not to systems themselves and not to "isolated" systems. Correlations (in Rovelli's "interactions" with physical systems) are the only thing that really exists. It should be noted that Rovelli does not introduce the subject. His role as an observer is played by the physical system. And all systems are equal. Each of them can either play the role of an observing system or the role of an observing system.

However, it is impossible to do without a concept of the subject, which does not mean that the interpretation of quantum mechanics must be subjective. Within the framework of contextual realism, the subject is desubjectiveized, i.e. it is understood as a "movement" (application of concepts, norms, rules) in reality, which is developed in reality itself). Any measurement of physical quantity that is made "here and now" may be one or the other, true or false. That is, any measurement of physical quantity is a phenomenon. The phenomenon is the subject. This does not mean that the subject, consciousness somehow affects objective quantum processes, but that the phenomenon has a normative (conceptual) dimension.

The naturalistic nature of the Rovelli approach and the mixture of categories is manifested in the interpretation of the notion of information. Rovelli said that there was no distinction between a physical system, between an observer as a physical system and an observed system. He said that quantum nature was information that an observer acquired. But the concept of information is not naturalistic. It involves the use of language, concepts. Language and concepts are used by the subject. For Rovelli, information exchange is a quantum mechanical interaction, an act of measurement made by the observing system over the observed system. But interaction in itself is not information exchange. It's just part of reality [Vernette 2006].

Correlationism is overcome by a therapeutic deflatsionist approach based on a careful distinction between ideal and real, norms and real things [Benoist 2017]. We apply this approach to the philosophy of quantum mechanics. Any physical system can play an observer role. At the same time, however, it takes on a special status. It can no longer belong to the category of real and therefore cannot be considered as interacting (in the sense of perturbing interaction) with the system being measured. As mentioned above, the interaction between the observer and the observed system can only be talked about in the sense of contact, without which measurement is certainly not possible. We are also talking about measurement in context. Getting into context is not an outrageous interaction, but a measurement of a thing as it is regardless of the measurement.[47]

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[47] "Measurements without interaction" has been studied. It turns out that the result of the measurement made over a quantum system by a device with a part of which the measured system does not interact has the same effect as the measurement made by the device interacting with it [Elitzur 1993], [DeWeerd 2002], [Bitbol 2019: 266]. According to the Bitball, "(...) the first decisive lesson: a suitable connection for determining the measurement results is not some "material" connection of the system with a part of the device, but an informative connection with the global structure of the device. (...) The second decisive lesson: in quantum experience, what matters is not the hypothetical process that takes place between preparation and detection, but its informative relation to the *final configuration of the* measuring instrument, which can be fixed almost at any moment before this detection" [Bitbol 2019: 266].

For example, the result of the photon-electron interaction can be measured at the moment of this interaction, or immediately after it, or some time after it by measuring the position or pulse of the scattered photon. It turns out

8. RCM in terms of the categorical difference between an observer and an observer

Let's return to the above described situation with systems S, O and P. In fact, the system O, if it is considered as a measurement tool, belongs to the category of ideal. In this case, it cannot be said that it interacts with system S in the sense of interaction of the perturbant. It "interacts" with O, of course, comes into contact with it, but only insofar as it plays the role of a measuring device, which by definition does not disturb the system being measured, but measures it, measuring the value of the physical quantity A assigned to this system. In this sense, a quantum instrument is no different from a classical instrument.

At the same time, the act of measurement, the use of the measuring device by the subject, is a real pragmatic and practical act, action. Usage O as a measuring instrument is its actual use, its actual measurement. In this sense, at this stage we deal with reality and the real things being measured, whereas before the measurement we dealt with the S system only theoretically, in terms of abstract quantum theory and the wave function describing the state of the S system. At the same time, the status of ideal here is attributed not to system S, which is real, but to quantum theory (theory is real only in the sense that it is rooted in reality, and also in the sense that it corresponds to some in the minimum sense of a certain reality - dispositional reality). The S system is real and has the certainty that it has - the certainty of the wave function encoding the probabilities of possible results of measuring the values of physical quantities.

On the contrary, observer P does not interact with the composite system S + O (and therefore it does not interact with either system S or observer O). For him,

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to be the same, regardless of the timing of the measurement. The state of the electron can be determined by measuring the photon state. Therefore, if one assumes that at the moment of measurement there is an interaction of the device with the quantum system, which, depending on the choice of the type of the device, leads to different results, one should assume that in the case when the measurement takes place at a later time the device has a causal influence on the past state of the electron.

In fact, it is more correct to say that everything happens as *if the* measurements in the present have a retroactive effect on what happened in the past. Everything looks *as if* in the present experimenter could change the past state of the electron at will.

This paradoxical view arises within the framework of metaphysical realism. From the point of view of our contextual realism, the result of the interaction has no certainty until it is measured. But a dimension is not an interaction that transforms one state into another, but a simple (non-disturbing by definition) dimension that, however, is only possible in one context or another. The result of the measurement is not an interaction, but a transition to a particular context. In this case, the reality fragment becomes more definite.

the O system has the status of a real physical system (not an ideal measuring instrument status) interacting with the S system. At the same time, the theory describing this composite system, that is, quantum mechanics and wave function, belongs to the category of ideal. According to the condition, observer P does not move to the pragmatic and practical area of real measurements. Therefore, status P is not the same as status O when O makes a real measurement and gets a certain value of the physical quantity A. A comparison of P with O becomes possible only if P also makes a real measurement over the system S + O. But in this case, observer P gets the same result as observer O (if O has already made a measurement). So in this sense, there's no dependence on the observer. The relativity that Rovelli talks about is the result of mixing the categories of real and ideal.

"Relativity" should be understood as contextual in the following sense. Quantum ontology and the values of physical quantities are not absolute, but context-specific. Quantum state - disposition state. Quantum system ontology (quantum ontology) - dispositional ontology. This is some kind of slice of reality with dispositional probabilistic certainty. This certainty is weaker than the classical certainty of visual material objects. This allows to define it in one or another context of measurement, i.e. in the context of quantum theory/norma application. Updating this or that possibility is not the collapse of dispositional reality into another reality, but the transition to the context of measurement. (Perhaps it's not quite correct to talk about quantum "dispositional reality". We are talking about a minimal - by means of the wave function - specific reality, not dispositional reality. If the wave function represented some absolute, even dispositive, quantum reality, then there would be a question about how, as a result of reduction of the wave function, this reality instantly turns into another reality).

In fact, the reduction of the wave function corresponds to the transition to the context of the application of the theory in which the reduced wave function only exists. Contextual realism is not metaphysical realism. In this sense, Rovelli is right: the metaphysical concept of reality must be weakened. In this sense, the wave function is not real, does not represent reality, as mentioned above, the observer can not clone the wave function of a single system if he did not prepare it. So it doesn't exist in relation to him.

Wave function can be called a tool for predicting quantum phenomena. This, however, is not pure instrumentalism. The wave function, using the example of Wittgenstein, is rooted in reality like a recipe for cooking.[48]

9. Quantum correlation in the context

We interpret the ERP-correlation, which Smerlak and Rovelli interpret from the point of view of relationalist realism [Smerlak 2007]. For Smerlak and Rovelli "in the context of the EPR debate, realism is understood as an assumption that, in Einstein's words, "there is a physical reality independent of justification and perception". [Einstein 1950]." In fact, that statement is ambiguous. If Einstein's words are understood in the sense that there is a predetermined reality with internal meaning and properties, structure, etc., then the criticism is correct. But if they are understood in the sense that reality as such does not depend on justification and perception (in the sense of its perception by the senses), then the critique of Smerlak and Rovelli means accepting the anti-realist position.

Smerlak and Rovelli continue:

> "We call this assumption "Einstein's realism." The RCM is moving away from such strict realism. The RCM adopts that physical reality is formed from individual events (facts) in which the interacting systems (objects) influence each other. Thus, it is assumed that quantum events exist only in interactions, and (this is the central point) the character of each quantum event is defined only in relation to the system involved in the interaction. In particular, the properties that any given system S has are defined only with respect to the physical system A that interacts with S and on which these properties are affected.

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[48] Wittgenstein (see Nachlass, Manuscript 160) indicates the existence of two kinds of rules, the difference between which is "grammatical", that is, logical in a broad sense: the rules of chess belong to the first kind, and the rules of cooking - to the second kind. Nothing corresponds to the rules of the game of chess in reality. They do not reflect the nature of chess pieces, as the latter do not have a nature independent of them, do not describe the chess game, and constitutionalize it. In this sense, these rules have no nature. On the contrary, "the rules of cooking and roasting must be appropriate to the nature of the meat", have real conditions of eating without which the purpose of cooking will not be achieved (see quote and analysis in [Benoist 2017: 129]). The reality in which they are rooted imposes constraints on the choice of these rules. However, the correspondence we are talking about here is not a mutual correspondence between the wording and "external reality", not isomorphism. In a generalized sense, however, one can say that the rules "reflect" (or describe) the nature of food.

It is precisely the rules rooted in reality, like the rules of cooking or, for example, context-dependent epistemic or linguistic rules, that is, rules that include elements of reality, and it is thanks to this that Wittgenstein calls "grammatical rules", which have relative autonomy rather than purely instrumental rules detached from reality. Purely functional rules, similar to chess rules, can be considered as limiting case.

The above said applies to the understanding of quantum mechanics as a Wittgenstein rule (hereinafter: c-rules) - quantum Wittgenstein grammar [Prissy 2014A]. Quantum rules, which include quantum theory and, in particular, the concept of wave function, in a generalized sense correspond to the nature of quantum reality, which is not a metaphysical object reality, located opposite the description of its quantum theory.

In our opinion, the ambiguity of the position remains. The above distinction between the ideal and the real is not made. In terms of contextual realism, reality is what it is. It does not depend on justification or perception. (There is no distance between the unconceptualized perception itself and reality [Benoist 2013].) In this sense, Einstein is right. Smerlak and Rovelli themselves note that Einstein's position is not metaphysical, nuanced and contains not only a "realistic" but also an instrumentalist aspect.[49]

Moreover, as far as the concepts of "fact" and "object" are concerned, Smerlak and Rovelli refer to Wittgenstein's *Tractatus* (§§ 1.1, 2.01, 2.011, 2.0121), while it is known that Wittgenstein II criticizes the traditional realistic position adopted in the Tractatus.

Critical comments on Rovelli's "realism" are also made in [Vernette 2006]: "It seems that Rovelli's approach does not clarify two concepts: physical quantity and physical reality. As we have seen, for him, the relationship between systems is fundamental. The math of relationships is the real problem. Of course, we can ask: "The mathematical law of what?

As noted by Bitbol, for Rovelli various observers have no common ground to compare their measurements. Therefore, despite the different results, a contradiction between them is impossible [Bitbol 2010].

Bitbol and Rovelli with co-authors believe that EPR-correlations can be interpreted without introducing the concept of non-locality. Smerlak and Rovelli speak of a "non-deterministic (as opposed to classical deterministic) causal correlation". "Non-locality" only takes place in the sense of classic deterministic non-locality. Quantum mechanics is local and complete, unless it is required to be absolutely ontological. Thus, within the RCM, the locale is not disturbed [Smerlak 2007], [Martin-Dussaud 2018].

One may ask: in relation to which observer does the statement about instantaneous influence between A and B make sense? Not in relation to A, because at the time and point of the space in which the measurement is made, A has no access to the measurement made by the observer B. And vice versa. The allegation of the correlation is retrospective. It refers to an observer who has taken the time to compare measurements made by A and B. Thus there is no non-local impact, i.e., no impact at the same time as the measurement was made [Bitbol 2010] (see also [Bitbol 1983]).

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[49] Note also that Arthur Fine refers to Einstein's position as a "natural ontological installation," which from Michel Bitbol's point of view has certain similarities (and differences) with Simon Blackburn's quasi-realism [Fine 1986], [Bitbol 1994], [Blackburn 1981, 1993]. The last position can also be interpreted as that of Wittgenstein himself [Blackburn 1981: 172]. The combination of "participatory modal realism" and quasi-realism, which is close to our understanding of contextual realism, is proposed in [Bitbol 2015].

10. Contextual realism of wave function instead of anti-realism and metaphysical realism

RKM has similarities with the interpretation of Everett's quantum mechanics. Rovelli tries to find a compromise between the instrumentalist Copenhagen interpretation and the realistic interpretation of quantum mechanics. Everett claims that his theory establishes a "bridge" between the positions of Bohr and Einstein [Everett 1957 Dissertation: 117].

At the same time, there are also significant differences. As mentioned above, for Rowelli, the wave function plays a purely instrumental role. For Everett, the wave function is real. Moreover, Everett proposes to consider the model of the entire universe as a universal wave function subject to linear evolution. In this consideration, the laws of physics are treated as internal correlations [Everett 1957 Dissertation: 117-118]. Along with Rovelli, we reject Everett monism.

Within the RCM, but not within multi-world interpretations of the Everett type, the observer and the observed systems actually interact. Within the RCM, there are real quantum events that are observed by each observer "here and now". These events are relative, but for a fixed observer they are objective.

Within the framework of multi-world interpretations, decoherence is introduced into the game. Since it preserves the confusion of quantum states, the occurrence of a specific measurement result in relation to a local observer is not explained.

For Everett, the probabilistic aspects of quantum mechanics arise again on a subjective level, as phenomena (phenomena) related to observers. It is argued that statistical statements are not independent hypotheses, but are derived from wave mechanics [Everett 1957 Dissertation: 119]. As is known, a lot of work has been done to derive the Born rules from quantum formalism using decision theory [Deutsch 1999], [Wallace 2010, 2012]. In our opinion, however, such a conclusion faces considerable difficulties, and at present there does not seem to be any consensus on whether it is possible at all.

For us, the wave function (together with quantum theory) is a rule-instrument rooted in reality, like the cooking recipe (Wittgenstein's example cited above). This is contextual "instrumental realism" that takes into account the existence of

quantum "beables" - elements of reality (the term Bell [Bell 1975, 1993: 174]).[50] "Realistic" multi-world interpretation and anti-realistic instrumentalist interpretation are two extremes. It seems to us that Rovelli combines realism and instrumentalism mechanically, since the wave function is a pure prediction tool for him. It is necessary to understand how the wave function is rooted in reality.

11. Quantum interaction and measurement.

Brown points out that within the RCM, the notion of interaction is primitive. Therefore it cannot be analyzed in terms of causal concepts as if there was some causal process between system S and observer O. The fact is that certain values are measured as a result of the measurement [Brown 2009]. We agree with that.

At the same time, Brown believes that the remainder of "dualism" is necessary to explain the transition from superposition to observed certain results. This is the dualism between the linear evolution of the tangled function and the relative specific property observed as a result of the measurement [Brown 2009].

We reject dualism. All dualisms, as we believe, are overcome by the "rooting" of the ideal in real (context), theory in reality. ("dualism" of categories is not dualism at all, but on the contrary, getting rid of dualism, which implies the interpretation of heterogeneous notions within one category). And this means that the "transition" to the observed value is not a real transition: an observer simply discovers that he or she is in a certain context, registers a certain value of a physical quantity, whereas at first the situation was uncertain. In that sense, he gets information. But this is not "pure information", but information about (in) its context, that is about the real state of the quantum system in this context.

So, from our point of view, this is not true dualism, but "dualism" of the ideal and real, theoretical and pragmatic. The introduction of this categorical difference removes true dualism. For us, "relativization", or indexation, is contextualization. It is a way to avoid contradictions between two descriptions of the same process. Observer O and observer P, describing the interaction between O and S, do not describe the same (definite) quantum reality, but different (definite) quantum realities. That is, the initial situation (before the description) is not fully defined.

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[50] Bell formed the term "beable" from "be-able." He contrasted it with the term "observ-able" [Bell 1993: 174]. For Bell, the Bible is the fundamental authentic elements of reality in space-time, primitive ontological *posits*. The "bibbles" include macroscopic conditions of preparation of quantum experiment and data obtained during the measurement. For him, "Bible" also means "physical" in contrast to "non-physical" [Bell 1975]. It is clear that a full realistic interpretation of any theory should be built on the basis of "Bible".

12. Mermina and RCM Correlationism

The position of Rovelli should be distinguished, for example, from the position of Mermin [Mermin1997], which really correlates, claiming that there are only correlations (relations), but not correlates - correlated entities. Jeffrey Barrett describes this position as [Barrett 1999: 217] (quoted in [Brown 2009]):

> "Correctly understood physics about correlations and only about correlations. It is not about correlations between certain physical registrations, nor about correlations between any other certain physical properties. It's about correlations without correlated entities. According to Mermin, "correlations have physical reality and what correlates does not."

Baret rightly criticizes correlationism, pointing out that relationships without the entities that enter into it cannot exist. He claims Rovelli's point of view is similar to that of David Mermin [Barrett 1999]. This impression can really arise. A closer look, however, shows that the RCM, as mentioned above, is not correlated. We share Matthew Brown's view that Rovelli's position is different from Mermina's because Rovelli's physical reality has more than just a relationship. The interactions resulting in certain values of physical quantities are also real. The latter are also real, albeit relative, depending on the choice of the observer, the boundary between the observer and the observer. At the same time, if the observer is fixed, the physical values are absolute.

Browne points out that Rovelli distinguishes between two types of relations: system-system and system-observer relations. The first are the interactions between the systems, which as a result can be tangled and quantum correlated. The second is the interaction between the system and the observer, where the system property is updated for the observer. Observing P, observing system S, observing O, views the relationship between S and O as a system-system relationship. Therefore, the information that observer P has about the S+O system is different from the information that observer O has about a certain value of a physical quantity [Brown 2009: 685]. (Some critics of the RCM also say that the "interaction" of observer O with system S in measuring the physical quantity is the transmission of "information").

Brown's distinction between the two types of relationship corresponds to the difference that we make between the categories of ideal, to which we refer the observer, and real, to which we refer the observed system. It is clear that for observer P the system S+O and, accordingly, subsystem O are real, while in the case of the relationship between S and O the latter plays the role of an ideal - normative.

In Brown's terminology, Observer P sets a new boundary between the system and the observer. Therefore, for him the state and properties of the system will be different. In our terminology, observation is made over another system: S+O. The border Brown talks about is the border between categories - the border of the real.

Brown argues that for Rovelli, correlated objects (relata) are defined, but they are defined in absolute terms, and in relation to the relationship itself. Thus, one cannot say that there is no certainty at all. It depends on the boundary drawn between the system and the observer [Brown 2009]. In our opinion, this certainty of correlating objects should be understood not in the sense of objects generated by an inner relation, but in the sense of real objects detectable in a context where it makes sense to talk about a certain observer as well. The observer does not form a quantum object, but a means of its detection.

13. Relativity is not relativism

There may be a suspicion that relativity is relativism. Within the framework of consistent relativism, ontology generally disappears. In other words, the concept of the real object disappears, because by definition the object implies preserving its identity.

Wood asks, for example, whether the existence (identity) of the electron within the RCM is absolute or relative? If relatively, the question arises that there is an object. If absolutely, then the question arises how is this possible under the RCM? [Wood 2010]

Wood offers two possible answers: 1) The system is a set of questions that can be asked (i.e. we are not talking about the system, but about the system as a set of questions). The set of questions and determines the absolute identity of the "system". This theoretical-informational approach does not seem viable to Voodoo, because it is not clear how to combine it with the fundamental concepts of physics and, in particular, with the concepts of space and time in which the system is located? 2) There is an absolute reality where the systems and the observers see the systems differently. Wood says it contradicts the RKM idea that everything is relative. The question also arises as to what that reality is. If the RCM is correct, we cannot observe it and therefore understand its nature, as everything is relative.

From our point of view, the "system of questions" referred to by Wood can be interpreted as a rule (the norm) for "interaction" with reality, to be more precise, for measuring reality (within the framework of Fuchs' quantum Bayesianism, we are talking about the interaction of the subject and reality). Such a rule is not separable from its paradigmatic applications, i.e. it is a "Wittgenstein rule". Any application of such rule in reality is a space-time language game. This means that the theoretical and information approach is compatible with fundamental physical concepts. The information itself is an epistemic dimension, not an ontological one. Therefore, a purely "informational" interpretation of quantum mechanics is impossible.

As for Wood's second answer, from the point of view of the contextual realism to which we adhere, it is not correct to raise the question of Wood's reality. Reality as such has no nature. She just is what she is. Both quantum systems and quantum observers and specific quantum events resulting from measurements are identified and defined in a given context. Thus, the answers 1) and 2) converge to the same contextual viewpoint.

Wood raises the problem of trans-identity of the object. Assuming that the identity of the system is relative, i.e. its very existence depends on the observer, the identity of any object seems to be lost.[51]

We understand dependence on the "observer" as dependence on context. The choice of a rule depends on the context. But being fixed, the same rule applies in different contexts. Rule (invariant) plays the role of (ideal) object. Trans-identically preserved. It can't be any other way. Trans-identity is assumed by the very notion of the rule.

For Rovelli, the points of view of various observers "should not be compared". Wood writes that "(...) It seems paradoxical how any description of the world can exist if even the existence of objects depends on the observer. What do observers observe if the observer is ontologically primary compared to the object?"

From our point of view, the norm (rule) precedes its new application, a new identification of the object or identification of a new object. In this and only this sense, it is primary compared to the object. We are talking about a real (concrete)

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[51] If quantum objects are relative, then how do they combine to form absolute macroscopic objects? Wood turns to David Wallas' idea of using the concept of "real pattern", introduced by Daniel Dennett [Wood 2010], [Wallace 2003], [Dennett 1991]. Macroscopic objects are real "paterns" (patterns) that are not represented directly in quantum mechanics formalism (see [Dennett 1991]). This sentence is consistent with contextual realism if we interpret Dennet's "real model" (patern) as what really exists in a given context. Vallas himself applies the concept of a real model in the philosophy of physics and, in quantum mechanics. In particular, he claims the dependence of ontology on scale.

object as an implementation (exemplification) of a norm/regulation. The role of an abstract or ideal object is played by the norm (rule) itself. The ideal object is "real" only in the sense of its rootedness in reality. Quantum concepts play the role of ideal "objects". They identify real quantum objects in one context or another. It is the presence of a general rule that allows us to speak about an objective, independent of the observer, quantum trans-identity. And any particular (real) quantum object, although identified within a point of view, i.e. in relation to an observer, is not generated by it, but as such exists independently of the observer.

14. Conclusion: "Democratization" of Copenhagen interpretation and contextual realism

The Copenhagen interpretation of quantum mechanics is formulated in a language containing a reference to an observer: a quantum event does not simply take place; it takes place for an "observer" whose role is played by a macroscopic system. It is thus assumed that there is a privileged system: a classical (macroscopic) observer who does not obey quantum laws.

In our opinion, there is a significant amount of truth here: the observer (if it is really an observer) and the observed (if it is really an observer) belong to different categories. In doing so, the statuses "observer" and "observed system" are attributed to the context.

Already for Bohr the epistemic (but not ontological) boundary between the observed system and the observer depends on the context. In our opinion, however, a stronger statement can be made: the observer and the observed system can change their status. An observer can become observable. And vice versa. In this sense, all physical systems are equal, and there is no privileged observer. But at the same time, there is always this categorical difference that Rovelli forgets.

One can agree with Rovelli that there is no need to introduce 'subjective states of consciousness', since any physical system can play the role of an observer. Rovelli writes [Rovelli 2018]:

> "As soon as we give up this exclusivity and realize that any physical system can play the role of a Copenhagen 'observer', we come to relational quantum mechanics". "Relational quantum mechanics - Copenhagen quantum mechanics, made more democratic, thanks to the interpretation of all physical systems on an equal footing".

Like Rovelli, we return to the Copenhagen interpretation and argue that it must be properly understood, corrected. Later interpretations were in many ways worse than the original interpretation of the founding fathers of quantum physics (although, it should be noted, they had different views and the term "Copenhagen interpretation" characterizes the situation only roughly).[52] In this case, unlike Rovelli, we accept a categorical distinction between the ideal observer (theory as a norm, concepts) and the real (observable) system (application of theory, real object). This allows us to get rid of metaphysical problems faced by various interpretations of quantum mechanics, including RKM.

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[52] Our proposed return to the Copenhagen interpretation, adjusted within the framework of contextual realism, can be compared to a return to the logic of the phenomenon. The concept of the phenomenon was introduced by Plato. And he discovered that every phenomenon has a normative structure: the phenomenon implies the difference between appearance and reality (and thus Plato introduced the notion of being into philosophy). Visibility may or may not match reality. In the history of philosophy, the concept of the phenomenon was subjected to deformations, trunctions and (in the 20th century phenomenology) absolutization and naturalization. For example, for Kant, as well as for Plato, the phenomenon is something that is not at all in the object itself, but always occurs in its relation to the subject and is inseparable from the idea of it. Kant's phenomenon also has a reason. But that reason is an unknown thing in itself. Benoit describes the Kantian phenomenon as "a handless phenomenon". Auguste Comte's phenomenon has no reason at all. It's using the expression Benoit, "orphan phenomenon." And so on. (For more details, see [Benoist 2016].) A proper understanding of a "phenomenon" is necessary for a proper understanding of a "quantum phenomenon".

The nature of physical reality or this or that fragment of it is not a definitely quantum or some other described more "fundamental" theory of all kinds of interactions. In one context, it can be quantum and in another classic. Finally, in the third context, it can be "fundamental". In "boundary" cases, the same empirical data can be interpreted, for example, both within classical theory and within quantum theory. And that means that both interpretations are correct. That is, there are actually not one, but different phenomena that have different nature. (A relativist, on the other hand, interprets the same phenomenon differently.)

In the theory of strings in the classical limit T and mirror duality link empirically equivalent theories with different space-time ("target space") (they are different at least in the classical limit. In full quantum theory, these dualities are theoretical (physical) equivalences). S-dualities link empirically equivalent string theories with various fundamental objects [Horowitz, 2004; Dawid 2016; Matsubara, 2018]. The following questions arise: "What these theories say about the real (actual or possible) world. And what do they say about real (actual or possible) space-time?" At first glance, we are dealing with what the philosophy of science calls empirical uncertainty.

Batiste LeBian and James Red provide a classification of different approaches to understanding this "uncertainty". In particular, the "common core" and "encompassing theory" approaches, a pluralistic approach, are considered. [LeBihan, 2018].

From the point of view of pluralism (different), the structures of each of the dual solutions of different theories are considered as co-installed structures in the real world. In a sense, the physical world is fragmented [Le Bihan, 2018].

There are two problems. 1) theoretical (epistemic) super-definition (instead of empirical uncertainty): all dual structures can be considered as explaining (describing) the same empirical data; 2) ontological problem of consistency of the notion of fragmented reality.

Our diagnosis is as follows: the assumption of metaphysical realism, which underlies all the approaches considered, including pluralistic (so we are actually talking about metaphysical pluralism), is false. The problems of overexposure and ontological fragmentation are a consequence of this false premise. They are resolved or eliminated within the framework of contextual realism.

Benoit writes, "The norms, as I understand them, are my realism - they have no other purpose than to capture the structures. And vice versa: structure is exactly what is grasped by the norm where it is applied in the right way in the right context." [Benoist 2017: 106]. In the case of string theory, this means that the pluralist position should be contextualized: to introduce context dependency instead of fragmented reality.

In quantum mechanics, compared to string theory, the situation is inverse: in a certain sense, one fully defined structure - quantum theory (we believe that the quantum theory is full) - corresponds to many different empirical data - not predetermined measurement results (only possible measurement results and their probabilities are predetermined). Instead of theoretical "uncertainty", there is an experimental super-definition. The multi-world interpretation of the type of interpretation of Everett can be seen as a kind of view that the world is fragmented. It is not different theoretical structures, but different empirical data that correspond to different fragments. As is clear from what has been said above, the best interpretation of Everett's interpretation is contextual, that is, pragmatic (a close view is expressed in [Bitbol 2015]). This is consistent with the contextualization of the theory we have proposed above.

Within the framework of a unified viewpoint, various string theory aspects of a deeper M-theory that plays a role in rules/norms. They are language games, i.e. the use of rules in different contexts. The fundamental elements of the theory and/or its space-time (ontology) are contextual. And maybe there is also a context in which there is one 'fundamental' M-ontology and/or space-time. M-theory also plays the role of embracing theory. Thus, in addition, contextual realism and (because realism is contextual), therefore, pluralism, allows a pluralist approach and approaches to a common core and embracing theory to be combined.

Here is the following analogy. Von Neumann's quantum mechanics is the general rule for Heisenberg's matrix mechanics and Schroedinger's wave mechanics. Strictly speaking, two mechanics are equivalent to each other only within the framework of von Neumann's approach. In their own contexts, they can be interpreted as having different ontologies.

Regarding the concept of dual physical theories, numerous definitions of which have been proposed in the philosophy of physics (see, for example, [Castellani, Forthcoming], [de Haro, The Heuristic Function...]), then from our point of view, the most common definition of it is the following: duality is (common) in a rule, that is, family resemblance. In particular, equivalent physical theories are dual physical theories with the same physical content.

Therefore, for example, we can also talk about corpuscular-wave dualism in quantum mechanics as a relation of duality: in one context the wave is a quantum-mechanical object, in the other - a particle, and in the third - neither a particle nor a wave, and has the ontology of potentials, defined within the framework of the joint von Neumann approach. In a broader context, the principle of conformity, as in a rule, establishes a "duality" between the classical and quantum mechanics themselves.[53]

As for the classical limit of quantum theory, it is not always what one would expect in terms of classical theory. That is, there is not always a (continuous) limit transition. For example, in quantum optics the situation is possible when the pressure exerted by light on the mirror is directed inside the interferometer, and from the point of view of the classical one is explained by the action of electromagnetic field, which is on its external side, and from the point of view of the quantum optics in the classical one - by photons inside the interferometer and as if pulling the mirror inside [Aharonov 2013]. Thus, on the ontological level, taking into account the causal "processes" and the spatial arrangement of matter, there is no limit transition. We argue that this is true, because in different contexts - classical and quantum - we deal with different ontologies (in particular, causal "processes"). We cannot say that one ontology (context) is genuine and the other, strictly speaking, is not, i.e. only approximate, because in this case one ontology would pass to another (even if there is no conceptual transition from quantum to classical).[54] We also refuse to interpret the situation as a fragmentation of reality if the latter is not understood as contextualization.

Within the framework of semiclassical mechanics, the boundaries between classical and quantum mechanics are vague, and one can even speak of semiclassical mechanics as a new theory. Semiclassical methods mix classical and quantum ideas and have their own field of application. Classic mechanics, for example, brings new ideas to the dynamic structure of the helium atom. Recently, semiclassical mechanics has been able to solve the problem of the helium atom in the spirit of Bohr's old quantum theory [Bokulich 2008]. Everything looks as if the status of applicability of classical concepts was stronger than purely instrumental. And indeed, according to contextual realism, correct application of the (genuine) concept in a context, as a result of which some object is identified, identifies the real object, the (real) thing itself.

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[53] Bitbol, on the contrary, rejects that quantum mechanics and, in particular, corpuscular-wave dualism reveal the deep nature of things. He believes that quantum theory is a "simple guiding method" of predicting phenomena [Bitbol 2019: 263]. We agree, however, with Bitball that quantum theory does not describe, does not represent a ready (definite, meaningful in itself) world. That is, traditional representationalism is rejected. In particular, there is no a priori particle or wave ontology.

[54] We can talk about continuous limit transition, for example, in the case of a simple reflection of light from a mirror. That is, we can talk about the reflection of an electromagnetic wave, and we can talk about the reflection of the flow of photons, which is as if a more accurate representation of the physical picture. In fact, it makes sense to talk about approaching only within the framework of the language game of inaccurate application of concepts or application of not quite suitable concepts.

There is no deep and only ontological essence. For Benoist, what can be said to exist in certain circumstances is "Making ontology sensitive". Classic ontology is different from quantum ontology. And it seems that, at least in some cases, semiclassical phenomena can have their own specific ontology.[55] That is, the classical reviewers of some semi-classical descriptions using both classical and quantum concepts are not always fictitious. For example, electrons moving in a synchrotron emit electromagnetic energy in full accordance with classical electrodynamics as if they were moving along trajectories. We can say that they really move along trajectories (which cannot be said about their movement within the atom).

Contextual realism, as we understand it, asserts that in the above examples, there is a variety of true phenomena and ontologies, which depend on the context and have different nature. By changing our viewpoint, we can suddenly move from one dimension of reality to another in which there is no point in talking about "the same" or similar things. The unity of physics and, consequently, of physical nature allows not only continuity and family similarities, but also discontinuities [Chain 2012].

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[55] In his book Brigita Falkenburg shows how the classical metaphysical concept of reality and the ontology of particles are becoming increasingly unsuitable at ever smaller scales in high energy physics [Falkenburg 2010]. For her, "the principle of conformity protects classic realism from a sudden disturbance in the quantum region". [Falkenburg 2010: 193]. In other words, it makes sense to talk about the continuous space of ontologies, between which there are family similarities.

Conclusions about quantum mechanics

1. The wave function is not only a predictive mathematical tool. In a generalized sense, it is the cause of quantum correlations, the reality of which is contextual.
2. The classic dualism "event" - "fact" (describing the event) is rejected. Thus, the assumption about the existence of predetermined (absolute, autonomous) events of the type of event reduction of the wave function (as some real process), expressed in the language of the wave function and the Born rule, is rejected.

3. There is no need to explain the reduction of the wave function. If the use of the wave function and the Born rules allow only to identify (in the context of their use) this or that element of reality as a result of the measurement procedure, there is no need to introduce into the game the concepts of a real physical reduction process and an independent quantum event, different from the fact of its representation.

4. It is necessary to take into account the logical difference, "failure" between the rule (theory, evolution of the wave function) and its application.

5. The known measurement problem in quantum mechanics is not solved but eliminated: "measuring process" is not a real process. It is wrong to think that as a result of measurement, regardless of the formalism of quantum mechanics, something happens, and then we express it in the language of theory. Regardless of the means of identification, nothing happens, is not a phenomenon, that is, is not a given.

6. The problem arises as a result of mixing the categories of ideal (theory) and real (application).

7. Quantum theory and the law of quantum probability do not describe an autonomous certain reality independent of them. The correspondence between them is of the same kind as the correspondence between the rules of roasting and cooked roast. The preparation of an experimental situation is part of the application of the theory.

8. In a certain sense, it is the section of reality where the (quantum) correlation takes place that is identified in context. As elements of reality, correlated events do not occur; they do. All it takes is their identification.

9. The Everett interpretation can be understood as introducing all possible contexts. If it is understood in the sense of purely theoretical, i.e. in the sense of

the rule, interpretation is acceptable. Substantialization of the rule, however, that is, metaphysical multi-world interpretation is problematic [Prissy 2016]. Jocelyn Benoit calls this approach bad baroque. Keith Fine would say that in this case reality is fragmented (for the notion of fragmented reality, see [Fine 2005]). But in our opinion, it is more correct to say that it is contextual. In the framework of metaphysical representation, this fragmentation looks like a plurality of noninteracting ("parallel") worlds.

Conclusion: the problematic nature of traditional epistemology and realism

The traditional epistemological problem of the subject's (thought, language) access to reality presupposes dualism of the subject of cognition and the object of cognition, and, accordingly, representationalism. The mental representation of the object as if plays the role of a screen between the subject and the object. The position of realism, if accepted, turns out to be epistemic: what is real is what is available to cognition. Epistemology thus turns out to be primary, but the ontology is secondary and, so to speak, exsanguinated: the epistemic realist is not interested in things themselves, but only in truth.

Aristotle, however, has primary ontology, epistemology is secondary. And indeed, true realism is ontological realism. Knowledge is generated in a reality of which the subject is a part.[56] So there is no "failure" between him and reality at first. The access problem is a pseudo problem (see also [Benoist 2011]).

The subject is not a passive observer of a predetermined reality of objects, their properties and relations, structures. Knowledge is action. At the epistemological level, it plays the same role as the action itself at the practical level.

In physics, epistemology and ontology and the relationship between them are formulated in terms of theory, its application and the physical object. Theory and its applications are two sides of the same learning process. As Bitbol says, theory refers to the "objectified", representative, logical pole. It's the perfect pole. The application of the theory refers to the "pole of pragmatism and practice", which has the appropriate prerequisites. Pragmatic prerequisites underlie the use of language, both everyday and scientific; practical - the basis of experimental action, experience. This is the Pole of Reality [Cruise 2014], [Bitbol 2015].

The "failure" between the categories of ideal and real, as indicated by Jocelyn Benloist in her work on realism [Benloist 2010-2019], is logical. In particular, the failure between theory and its application is logical, not substantive. Ideal (norms, concept theories), however, is developed in reality. True theory and its concepts are rooted in reality and are nourished by it in the sense that they meet the conditions of suitability (conformity of applicability area) and adequacy (integration of real things and experiences in the use of theory and its concepts).

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[56] "As for the knowledge to which such an attitude is attributed to what one learns, this is not the case. True, it might seem that knowledge is a measure and what is cognizable is measurable, but in reality it turns out that although all knowledge concerns what is cognizable, but not all cognizable is correlated with knowledge, because in a sense knowledge is measured by what is cognizable. (Aristotle, Metaphysics, Book 10, Chapter 6.)

Therefore the mentioned logical failure is logically closed: theories and concepts are designed to capture reality, the real things themselves. Otherwise, they turn out to be pseudo theories and pseudo concepts. The language games of their use within the framework of "life forms" of physical theories and related practices and represent such seizures. The pseudo-problem of applying theory or concepts to reality occurs only when the logical failure between them is substantiveized, considered as a failure of the substance. The problem of "failure" is actually the Wittgenstein problem of following the rule.

Our position is realistic, but not metaphysical. And not anti-metaphysical, because we accept the possibility of knowing things themselves. Traditional metaphysics, which accepts norms for special realities, decontextualizes them and their application, is rejected. The nonmetaphysical approach is contextual [Benoist 2017 L'adresse], [Pris 2008; Pris 2012, 2014 Physics and Metaphysics, 2014A, 2018].

Norms are used in context to measure the reality in which they are rooted. Such applications are the essence of Plato's phenomenon (phenomenon) [Benoist 2016 Logique]. In Wittgenstein terms, the norms are the rules governing language games within the framework of a life form. That is why we consider language games as Plato's phenomena in Wittgenstein's clothing. The logical failure between the rule and the language game is closed initially in the sense that any rule assumes the existence of paradigmatic cases of its applications, in relation to which the question of correctness does not arise.

That's our Wittgenstein position. It coincides with Jocelyn Benoist's next contextual position, expressed in slightly different words [Benoist 2017: 99]:

> "L'écart entre le factuel - le reel: ce qui n'est jamais que ce qu'il est - et la norme qui a vocation à le cerner, de facon correcte ou incorrecte, me parait constituer une structure fondamentale de ce que j'appelle (...) "réalisme": by the fact that there is always only what it is - and the norm that has the purpose of revealing it, whether correctly or incorrectly, (...) is the fundamental structure of what I call (...) "realism").

The initial absence of failure between subject and object means that these concepts are secondary. Reality as such is not a predetermined metaphysical reality of objects, their properties, relations between them, structures, and so on. The metaphysical view of reality has a certain meaning, but it is secondary and must be understood correctly.

The starting point can only be this: reality is what it is. As such, it has no predetermined structure or properties. As such, it has no conceptual component.

That is, conceptual does not apply to the definition of reality. Conceptualized reality is secondary.

Generally speaking, physical theory does not apply to predetermined physical objects - the concept of an object implies certainty, identity, repeatability, reproducibility - but to reality itself.[57] The theory "measures" reality, identifies real things - the very things that, as a result of identification, turn into real objects in the broad sense. The real object in the broad sense we call, thus, everything that has an identity, not only visual material bodies of classical mechanics or objects of our environment.

Before his identification, the real object was not an object. He had a fact - he was an element of reality, but he had no identity, no conceptual component. Consequently, it could not be compared with other objects. He couldn't be ascribed certain properties. Such an "object" could have acquired another identity.

In other words, the real object is identified only in the context of applying the theory. He is a contextual object. It does not exist by itself as a certain object in a decontextualized, absolutized form.

At the same time, as a result of its systematic identification and formation of a well-established, reproducible context, the contextual object as if turns into a metaphysical decontextualized object, which can be referred to mechanically. This is how this or that physical "life form" is formed - the well-established field of application of physical theory. The presence of such an area does not exclude the possibility of a new, unforeseen application of the theory. The life form is a conceptualized area of reality. It seems to be immersed in reality as such, which can be imagined as a disposition background.[58]

We see that taking into account pragmatic and practical measurements makes it possible to establish a connection between epistemology and ontology, which turns out to be contextual. At the same time, it makes it possible to develop a critique of the notion of the object, to understand what is happening on the border of the conceptual and real. This border is mobile. The conceptual can become real and vice versa: the real can acquire the status of a norm.

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[57] In fact, certainty and identity are the same thing, and repeatability and reproducibility (also close concepts) are consequences of identity.

[58] As Michelle Bitbol notes, the concept of "dispositional background" is becoming increasingly popular in the philosophy of quantum mechanics [Bitbol 2015: 159-160, 168]. For the analysis of "potential" or "possible" properties of quantum systems, see [Sudbery 2016].

It should be noted that according to Heisenberg, the "non-actualized" physical properties of quantum systems are "in the middle between the idea of an event and the actual event, a strange kind of physical reality just in the middle between possibility and reality" [Heisenberg 1958: 42] (quoted in [de Ronde 2018 B]). In fact, as De Rond and Masri rightly point out, probabilistic (misleading) predictions are also relevant to elements of reality [de Ronde 2018 B].

In classical mechanics the object is individualized (one can say visually) by means of its position in space and time. Its condition is determined by its spatial position and speed (pulse). It's an "object" too, but in a broader sense.

In theory, a mechanical object is a set of points in coordinate space, and its state is a set of points in phase space. These are ideal (abstract) objects.

A real mechanical object may have different properties. "Material point", "absolutely solid body", "absolutely elastic body" - concepts, perfect objects. But they can be applied in real situations. In the context of a real object can be considered and therefore be a real material point, a real absolutely solid body, a real absolutely elastic body and so on.

The ideal objects should be understood correctly. It is not a question of a substantive ideal of metaphysical platonism, in comparison with which any real body can only be an approximation. We're talking about the norm. We can also say that we are talking about the concepts of "material point", "(absolutely) solid body" and so on. A concept (norm) by definition allows for both precise and approximate applications. In this sense, the real mechanical body, depending on the context, can be seen as a material point, an absolutely solid body, a deformable body. The problem of the unattainability of the ideal disappears. That's what Benoist writes [Benoist 2018]: 20, "Réalismes anciens et nouveaux..."], "(...) un réalisme non plus de l'idéalité, mais de la règle, qui traite les instances réelles non plus comme des approximations de quoi que ce soit, mais comme des applications, correctes ou incorrectes, de la règle", but rules, which treat real instantiations not as an approximation to anything, but as applications, correct or incorrect).

The feature of classical mechanics is that in principle the state of the system can be measured without perturbation of the system itself. Therefore, it can be considered simultaneously from different points of view, in different reference systems.[59] It kind of turns out to be predetermined. Mathematical formalism seems to be literally reflecting external mechanical reality. The difference between reality and theory becomes invisible. But that difference exists.

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[59] On the contrary, in quantum mechanics, choosing one point of view excludes choosing another.

Moreover, let us note this once again, theory and reality belong to different categories: theory belongs to the category of ideal, not real.

In fact, a predetermined mechanical reality is a reality already formed - identified and established - through theory and experience. Unlike quantum mechanics, in classical mechanics such deterministic predetermined reality can be formed.

Quantum theory is such that only a predetermined probability reality can be formed as a result of the "interaction" of theory and experience. Within this reality, only the probability of the registration of an event is predetermined. There's no point in talking about a reliable prediction of an event. As a result of physical measurement, the state of the quantum system changes abruptly and stochastically.

Quantum objects, generally speaking, are not visualizable. These are objects in a broader sense. The wave function at a given time individualizes a quantum object - the state of the quantum system at a given time. It should not be forgotten, however, that the wave function and therefore the state of the quantum system is determined only in relation to some observer, or, as we say, in the context of observation.

Thus, we believe that the philosophy of physics should distinguish between ideal objects and real objects. The first essence of the concept of the second, that is, rules (norms) of identity, identity, identification of elements of reality - real objects. Any rule (concept, norm) can be considered as a rule of identity, i.e. as a criterion of "the same"[60]. We can be *given* this or that real object when and only when we have a rule for its identification, the corresponding concept. We are *given a* real object when and only when we apply this rule correctly. Rule (norm) implies a "life form" in the sense of the late Wittgenstein philosophy. It makes sense to talk about objects and true statements only within a life form. The nature of a real object is determined by the nature of the corresponding life form and its norms, "grammar".

As the conceptual device of quantum mechanics differs from the device of classical mechanics, it is possible to tell that we deal with two various physical "life forms". For example, in quantum mechanics the concept of a material body (material point) having certain positions in space and speed (impulses) is absent.

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[60] The concepts are diverse. Correct application of the view concept allows to identify the view or real object of the given view, but does not allow to assert that it is the *same* specific object. The singular concept allows identification of the same specific object. For example, your own name is a singular concept.

The reason is simple: at the microscopic (quantum) level, reality has a different nature. Quantum particles are *defined* differently from classical particles. They have a probabilistic nature, they show both corpuscular and wave properties, they have no trajectories (to be more exact, in the general case it is senseless to speak about the trajectory of a quantum particle or about a concrete quantum particle), individuality, they cannot be visualized. The states of quantum particles interfere with each other and "get confused", forming a single system (from the mathematical point of view - these are the consequences of the linear structure of the Hilbert Space), within which the quantum correlation is shown, looking from the classical point of view as a range of action. Still, we can say that the electron also has position and impulse. But these positions and impulses are physically interpreted by non-switching operators acting in the hilbert space of the electron wave functions describing its state.

Due to the above, reduction of quantum physics to classical physics is impossible. Partial reduction is possible in this or that context and in this or that sense. Such partial reduction is a manifestation of the principle of conformity, which can be understood in a broad sense as the principle of unity of physics, compatible with physical pluralism and the existence of ontological, epistemological and conceptual "breaks" in the physical world [Prissy 2012].

Introduced above distinction between ideal and real objects allows to expand concept of object and to keep it within the limits of quantum mechanics. The quantum state (quantum system), as mentioned above, can be considered in the context of observation in a broad sense. This object is defined in the context of its preparation, that is, in the context of measurement.

The wave function "describes", identifies the state of the quantum system. This state is not a visual classic object with predetermined classical properties. It has, however, predetermined probabilistic, dispositional properties. In quantum mechanics, potentials are given, not the position of the system in phase space (coordinates and velocities). When measuring a physical quantity, there is a certain probability of obtaining a certain value. The set of probabilities depends on the choice of physical quantity. From the mathematical point of view such ontology of potentials is described by a vector, to be more exact, a straight line, in the Hilbert space of the quantum system (the vector of the Hilbert space cannot be visualized in the ordinary sense).

In particular, as it is known, Heisenberg's ratio of uncertainty, pointing to the impossibility of simultaneous precise measurement of coordinates and impulses

of quantum "particle", is not an epistemic ratio, as if it makes sense to talk about this kind of simultaneous measurement, but it would be unfeasible in practice. In fact, precise measurement of coordinates and pulses of a quantum particle at the same time makes no sense. As maths say, it's not defined.

In terms of a quantum object or phenomenon - the object is identified within a phenomenon - it is possible to interpret, for example, a quantum correlation. It has no deeper nature than that revealed by the application of quantum theory to describe it. At the same time, it cannot be said that it has no nature at all. Its nature is determined by quantum theory - not less, but not more.

The cause of quantum correlations is a confusing wave function. Corrective quantum events are not autonomous, but are defined in the context of their observation. Regardless of their means of identification, there are no events. The reduction of the wave function in the "measurement process" is not a real physical process that needs to be explained, but a transition to the context of measurement of a specific physical quantity value. Accordingly, measurement is not a physical interaction leading to a change in the state of the system, but an identification of contextual physical reality.

The concept of quantum reality of potentials - reality as a dispositional background - has Aristotelian roots. He was approached, for example, by Werner Heisenberg. The transformation of this kind of reality cannot be understood in the image and likeness of a transformation of a classical material (in the broad sense) substance. This manifests itself when considering the measurement problem in quantum mechanics. The reduction of the wave function as a result of measuring quantum physical quantities is not described by the Schroedinger equation. The latter only describes the evolution of the disposition background to the measurement act. Attempts to modify the formalism of quantum mechanics in such a way that it allowed to explain the reduction of the wave function, that is, the transformation of the disposition background as a physical process, or by introducing the consciousness of the observer into the game were unsatisfactory.

In fact, the quantum state reduction problem is a pseudo problem. Just as, according to Gödel, the axiomatization of mathematics cannot be complete - there are always true statements that cannot be deduced formally - just as in the philosophy of consciousness there is an "explanatory failure" between phenomenal consciousness and its (for example), In quantum mechanics the problem of measurement requires for its "solution" to take into account the pragmatics and practices of the use of theory. The complete formalization of physical theory in such a way that it can describe the experience itself, i.e. the concrete result of the measurement arising from experience, is impossible, because theoretical theory belongs to another category. Applying theory to reality requires the involvement of real (non-formalized) experience. In the end, it makes no sense to formalize the act itself, the "process" of applying the theory. That is why it can be argued that in terms of content, the measurement problem is a pseudo-problem.

Problem of application of the quantum theory and quantum concepts to reality, that is, the quantum problem of measurement, - instantsiatsiatsii vitgenshteynovskoi problem sledeniya praglu, that is, problems "provala" mezhdu pravla and his application [Pris 2008, Pris 2014B]. The role of the Wittgenstein rule, which "measures" physical reality within the language game of its application, is played by quantum theory.[61] It is an interpretation of the Copenhagen interpretation within the framework of contextual realism.

Quantum theory is "real" in the sense and only in the sense that it is not a pseudo-theory, that is, it represents a real theoretical intention, has a real area of its applicability. The very existence of rule theory implies the existence of well-established language games of its applications, in which the said "failure" is closed by definition. The correctness of the new application of the theory requires substantiation and justification.

The measurement problem, or the problem of applying quantum theory to reality, is the result of mixing the categories of ideal, to which the theory refers, and real, to which its application refers. It is of a logical nature and is removed logically.

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[61] Giovanni Mion quotes Goethe: "The greatest art in theoretical and practical life consists in transforming the problem into a postulate; that way one succeeds". According to Mion, this is what Einstein did, creating the service station, and Wittgenstein, solving the problem of skepticism. We argue that the same is true for the problems of quantum mechanics. Bitbol writes that the riddles and paradoxes of quantum mechanics, instead of remaining insuperable exceptions, were implicitly transformed into norms and became the source of new quantum physics [Bitbol 2019: 220].

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Contextual Realism and Quantum Mechanics

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Abstract

The cause of quantum correlations is a confusing wave function. Corrective quantum events are not autonomous, but are defined in the context of their observation. Regardless of their means of identification, there are no events. The reduction of the wave function in the "measurement process" is not a real physical process that needs to be explained, but a transition to the context of measurement of a specific physical quantity value. Accordingly, measurement is not a physical interaction leading to a change in the state of the system, but an identification of contextual physical reality. The measurement problem, or the problem of applying quantum theory to reality, is the result of mixing the categories of ideal, to which the theory refers, and real, to which its application refers. It's eliminated logically. The problem is the instantiation of the Wittgenstein problem of following the rule. The role of the Wittgenstein rule (norm), which "measures" physical reality within the linguistic game of its application, is played by quantum theory.